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ANNALS
OF THE
NEW YORK ACADEMY OF SCIENCES,
VOLUME V.

I.—*A Catalogue of North American Palæozoic Crustacea
confined to the non-trilobitic genera and species.*

BY ANTHONY W. VOGDES.

Read April 1, 1899.

I. SYSTEMATIC ARRANGEMENT OF THE GENERA.

MEROSTOMATA.

EURYPTERIDÆ.

- EURYPTERUS, De Kay, 1825; *Annals N. Y. Lyceum Nat. Hist.*, vol. 1, p. 375.
DOLICHOPTERUS, Hall, 1859; *Palæont. New York*, vol. 3, p. 414.
ECHINOGNATHUS, Walcott, 1882; *Am. Jour. Sci.*, 3 series, vol. 23, p. 213.
ADELOPHthalmus, Jordan & Meyer, 1854; *Crust. Steinkohl. Saarb.*, p. 8.
GLYPTOSCORPIUS, Peach, 1882; *Trans. Royal Soc. Edinb.*, vol. 30, p. 516.
ARTHROPLEURA, Jordan & Meyer, 1854; *Crust. Steinkohl. Saarb.*, p. 13.

PTERYGOTIDÆ.

- PTERYGOTUS, Agassiz, 1844; *Mon. Poissons Foss.*, Note p. xix.
SLIMONIA, Page, 1856; *Advance Text-Book Geology*, p. 135.
STYLOXURUS, Page, 1856; “ “ “

SYNZIPHOSURA.

- ACANTHOTHELSON, Meek & Worthen, 1865; *Proc. Acad. Nat. Sci. Phila.*, vol. 17,
p. 46. *Geol. Survey Illinois*, vol. 2, p. 399.

XIPHOSURA.

CYCLIDÆ.

- CYCLUS, De Koninck, 1841; *Mem. Acad. Sci. Belgique*, vol. 14, p. 13.
DIPELTIS, Packard, 1885; *American Naturalist*, vol. 19, p. 293.

BUNODIDÆ.

- BUNODES, Eichwald, 1854; *Beiträge Geol. u. Pal. Russ.*, p. 131.
 HEMIASPIS, Woodward, 1865; *Quart. Jour. Geol. Soc. London*, vol. 21, p. 490.
 EXAPINURUS, Nieszkowski, 1859; *Archiv. Nat. Liv. Ehst. u. Kurl*, vol. 1, p. 380.
 PSEUDONISCUS, Nieszkowski, 1859; " " " " vol. 1, p. 381.

LIMULIDÆ.

- BELINURUS, Koenig, 1820; *Icones Foss. Sectiles*, pl. 18, fig. 230.
 PRESTWICHIA, Woodward, 1867; *Quart. Jour. Geol. Soc. London*, vol. 23, p. 32.
 LIMULUS, Müller, 1785; *Entomostraca*, etc., p. 124.
 PROTOLIMULUS, Packard, 1886; *Mem. Natl. Acad. Sci.*, vol. 3, p. 150.
 NEOLIMULUS, Woodward, 1868; *Geol. Mag.*, vol. 5, p. 1.

PHYLLOPODA.**CERATIOCARIDÆ.**

- HYMENOCARIS, Salter, 1852; *Rept. 22d Meeting Brit. Assoc. Adv. Sci. Trans.* p. 56.
 CERATIOCARIS, McCoy, 1849; *Annals & Mag. Nat. Hist.*, 2d series, London, vol. 4, p. 412.
 ECHINOCARIS, Whitfield, 1880; *Am. Jour. Sci.*, 3d series, vol. 19, p. 34.
 DIDYOCARIS, Salter, 1860; *Ann. & Mag. Nat. Hist.*, 3d ser., London, vol. 5, p. 161.
 DITHYROCARIS (Scouler) Portlock; *Geol. Rept. Londonderry*, etc., 1843, p. 313.
 PROTOCARIS, Walcott, 1884; *Bull. U. S. Geol. Survey*, No. 10, p. 50.
 ELYMOCARIS, Beecher, 1884; *2d Geol. Survey Penn.*, vol. PPP., p. 13.
 TROPIDOCARIS, Beecher, 1884; " " " " p. 15.
 PHYSOCARIS, Salter, 1860; *Ann. & Mag. Nat. Hist.*, 3d ser., London, vol. 5, p. 159.
 PHASGANOCARIS, Novák, 1886; *Sitzungsb. Böhm. Gesell.*, 1886, p. 498.
 ACANTHOCARIS, Peach, 1882; *Trans. Royal Soc. Edinb.*, vol. 30, p. 511.

DISCINOCARIDÆ.

- DISCINOCARIS, Woodward, 1866; *Quart. Jour. Geol. Soc. London*, vol. 22, p. 504.
 SPATHIOCARIS, Clarke, 1882; *Am. Jour. Sci.*, 3d series, vol. 23, p. 477.
 PHOLADOCARIS, Woodward, 1882; *Geol. Mag.*, Dec. 2, vol. 9, p. 388.
 ELLIPSOCARIS, Woodward, 1882; " " " " p. 444.
 Woodward, 1882; *Annales Soc. Géol. Belgique*, vol. 8, *Mémoires*, No. 4, p. 45.
 LISGOCARIS, Clarke, 1882; *Am. Jour. Sci.*, 3d series, vol. 23, p. 478.
 CARDIOCARIS, Woodward, 1882; *Geol. Mag.*, Dec. 2, vol. 9, p. 386.
 DIPTEROCARIS, Clarke, 1883; *Am. Jour. Sci.*, 3d series, vol. 25, p. 121.
 PTEROCARIS, Barrande, 1872; *Syst. Sil. Bohême*, vol. 1, *Suppl.*, p. 464.
 CRESCENTILLA, Barrande, 1872; " " " " p. 507.
 APTYCHOPSIS, Barrande, 1872; " " " " p. 455.
 PELTOCARIS, Salter, 1863; *Quart. Jour. Geol. Soc. London*, vol. 19, p. 87.
 PINNOCARIS, Etheridge, 1878; *Proc. Royal Phys. Soc. Edinb.*, vol. 4, p. 167
 PTYCHOCARIS, Novák, 1885; *Sitzungsb. Böhm. Gesell.*, 1885, p. 343.

RHINOCARIDÆ.

RHINOCARIS, Clarke, 1888; Palæont. New York, vol. 7, p. lviii.

COLPOCARIS, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 334.

SOLENOCARIS, " " " " vol. 23, p. 335.

[Name should be changed; pre-occupied by J. Young: see *Strigocaris*.]

MESOTHYRA, Hall & Clarke, 1888; Palæont. New York, vol. 7, p. 187.

SACCOCARIS, Salter, 1868; Rept. Proc. Geol. Polytech. Soc., vol. 4, p. 588.

LINGULOCARIS, Salter, 1866; Mem. Geol. Sur. vol. 3, pp. 252, 253, and 294.

SOLENOCARIS, Young, 1868; Proc. Nat. Hist. Soc. Glasgow, vol. 1, p. 171.

ROSTROCARIS, Kinnear, 1887; Trans. Edinb. Geol. Soc., vol. 5, p. 417.

CARYOCARIS, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 139.

ENTOMIDELLA, Jones, 1873; Annals and Mag. Nat. Hist. 4th series, London, vol. 11, p. 416.

ARCHÆOCARIS, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335.

MYOCARIS, Salter, 1864; Quart. Jour. Geol. Soc. London, vol. 20, 1864, p. 292.

ESTHERIA, Rüppell, 1857; Mus. Senckenberg., vol. 2, p. 119.

LEAIA, Jones, 1882; Mon. Fossil Estheriæ, p. 115.

SCHIZODISCUS, Clarke, 1888; Palæont. New York, vol. 7, p. 207.

BIVALVED ENTOMOSTRACA.

CYPRIDINIDÆ.

CYPRIDINA, Milne-Edwards, 1838; Lamarck's Anim. Sans Vert., vol. 5, p. 178.

CYPRIDINELLA, Jones & Kirkby, 1874; Mon. Carboniferous Entom., p. 21.

CYPRIDELLINA, Jones & Kirkby, 1874; " " " p. 25.

SULCUNA, Jones, 1873; Quart. and Jour. Geol. Soc. London, vol. 29, p. 411.

CYPRELLA, De Koninck, 1841; Mem. Acad. Royale Bruxelles, vol. 14, p. 19.

BRADYCINETUS, Sars, 1865; Oversigt af Norges Marine Ostracoder.

PHILOMEDES, Lilljeborg, 1853; Crust. in Scania occurrentibus, p. 175.

RHOMBINA, Jones & Kirkby, 1874; Mon. Carboniferous Entom., p. 43.

ENTOMOCONCHIDÆ.

ENTOMOCONCHUS, McCoy, 1839; Jour. Geol. Soc. Dublin, vol. 2, p. 91.

OFFA, Jones & Kirkby, 1874; Mon. Carboniferous Entom., p. 53.

POLYCOPIDÆ.

POLYCOPE, Sars, 1865; Oversigt af Norges Marine Ostracoder.

ENTOMIDIDÆ.

ENTOMIS, Jones, 1861; Mem. Geol. Survey Scotland, Expl. Map 32, p. 137.

CYTHERELLIDÆ.

CYTHERELLA, Jones & Bosquet, 1848 and 1852.

CYTHERELLINA, Jones & Holl, 1869; *Annals & Mag. Nat. Hist.*, 4th series, London, vol. 3, p. 215.

CYTHERINA, Lamarck, 1818; *Animaux Sans Vert.*, vol. 5, p. 125.

ÆCHMINA, Jones & Holl, 1887; *Annals & Mag. Nat. Hist.*, 4th series, London, vol. 3, p. 217.

LEPERDITIDÆ.

LEPERDITIA, Rouault, 1851; *Bull. Soc. Geol. France*, 2d series, vol. 8, p. 377.

BEENIX, Jones, 1884; *Proc. Berwickshire Naturalist Club*, vol. 10, p. 316.

ISOCHILINA, Jones, 1858; *Annals & Mag. Nat. Hist.*, 3d series, London, vol. 1, p. 248.

PRIMITIA, Jones & Holl, 1865; *Annals & Mag. Nat. Hist.*, 3d series, London, vol. 16, p. 416.

BEYRICHTIA, McCoy, 1846; *Synopsis Sil. Foss. Ireland*, p. 57.

BEYRICHIELLA, Jones & Kirkby, 1886; *Geol. Mag.*, n. s., Dec. 3, vol. 3, p. 438.

KIRKBYA, Jones, 1869; *Annals & Mag. Nat. Hist.*, 4th series, London, vol. 3, p. 223.

MOOREA, Jones & Kirkby, 1869; *Annals & Mag. Nat. Hist.*, 4th series, London, vol. 3, p. 225.

PHREATURA, Jones & Kirkby, 1886; *Quart. Jour. Geol. Soc. London*, vol. 42, p. 507.

STREPULA, Jones & Holl, 1886; *Annals & Mag. Nat. Hist.*, 5th series, London, vol. 17, p. 403.

BOLIA, Jones & Holl, 1886; *Annals & Mag. Nat. Hist.*, 5th series, London, vol. 17, p. 360.

KLÆDENIA, Jones & Holl, 1886; *Annals & Mag. Nat. Hist.*, 5th series, London, vol. 17, p. 362.

BEYRICHIOPSIS, Jones & Kirkby, 1886; *Geol. Mag.*, Dec. 3, vol. 3, p. 434.

PRIMITIOPSIS, Jones, 1887; *Notes on some Sil. Ostracoda from Gothland*, p. 5.

PLACENTURA, Jones & Holl, 1886; *Annals & Mag. Nat. Hist.*, 5th series, London, vol. 17, p. 407.

KYAMODES, Jones, 1888; *Annals & Mag. Nat. Hist.*, 6th series, London, vol. 2, p. 295.

CYPROSIS, Jones, 1881; *Geol. Mag.*, n. s., Dec. 2, vol. 8, p. 338.

OCTONARIA, Jones, 1887; *Annals & Mag. Nat. Hist.*, 5th series, vol. 19, p. 404.

CYPRIDÆ.

AGLAIA, Brady, 1867; *Challenger Exped.*, Rept. on Ostracoda, p. 33.

CANDONA, Baird, 1850; *History Brit. Entomostraca*, p. 159.

ARGILLÆCIA, Sars, 1865; *Översigt af Norges Marine Ostracoder*.

MACROCYPRIIS, Brady, 1867; *Intellectual Observer*, vol. 12, p. 119.

BYTHOCYPRIIS, Brady, 1860; *Challenger Exped.*, Rept. on Ostracoda, p. 45.

BAIRDIA, McCoy, 1844; *Synopsis Carboniferous Foss. Ireland*, p. 164.

DARWINULIDÆ.

- DARWINELLA, Brady & Roberson, 1872; *Ann. and Mag. Nat. Hist.*, 4th series, vol. 9, p. 50. Name pre-occupied and changed to—
DARWINULA (Brady & Roberson), Jones, 1885; *Quart. Jour. Geol. Soc.*, vol. 41, p. 346.

CYTHERIDÆ.

- CYTHERE, Müller, 1785; *Entomostraca*, etc., p. 64.
XESTOLEBERIS, Sars, 1865; *Översigt af Norges Marine Ostracoder*, p. 68.
BYTHOCYTHERE, “ “ “ “ “
CARBONIA, Jones, 1870; *Geol. Mag.*, vol. 7, p. 218.
YOUNGIA, Jones & Kirkby, 1886; *Quart. Jour. Geol. Soc.*, London, vol. 42, p. 507.
THLIPSURA, Jones & Holl, 1869; *Annals & Mag. Nat. Hist.*, 4th series, London, vol. 3, p. 213.
BURSULELLA, Jones, 1887; *Notes on some Sil. Ostracoda from Gothland*, p. 7.
ARISTOZOE, Barrande, 1872; *Syst. Sil. Bohême*, vol. 1, Suppl., p. 474.
OROZOE, “ “ “ “ “ “ p. 537.
CALLIOZOE, “ “ “ “ “ “ p. 503.
ZONOZOE, “ “ “ “ “ “ p. 554.
HIPPA, “ “ “ “ “ “ p. 516.
BOLBOZOE, “ “ “ “ “ “ p. 500.
ELPE, “ “ “ “ “ “ p. 510.
NOTHOZOE, “ “ “ “ “ “ p. 536.
CARYON, “ “ “ “ “ “ p. 505.
CRYPTOZOE, Packard, 1886; *Proc. Acad. Nat. Sci. Phila.*, p. 381.
CYTHEROPSIS (McCoy), Barrande, 1872; *Syst. Sil. Bohême*, vol. 1, Suppl., p. 508.

CIRRHIPIDA.

- PLUMULITES, Barrande, 1872; *Syst. Sil. Bohême*, vol. 1, Suppl., p. 565.
STROBILEPIS, Clarke, 1888; *Palæont. New York*, vol. 7, p. 212.
PALŒOCREUSIA, Clarke, 1888; “ “ “ “ “ p. 210.
PROTOBALANUS, Whitfield, 1889; *Bull. Am. Mus. Nat. Hist. N. Y.*, vol. 2, p. 66.
TURRILEPAS, Woodward, 1865; *Quart. Jour. Geol. Soc. London*, vol. 21, p. 489.

DECAPODA.

- ANTHRAPALÆMON, Salter, 1861; *Quart. Jour. Geol. Soc. London*, vol. 17, p. 529.
PALÆOPALÆMON, Whitfield, 1880; *Am. Jour. Sci.*, 3 series, vol. 19, p. 40.
CRANGOPSIS, Salter, 1863; *Quart. Jour. Geol. Soc. London*, vol. 19, p. 80.
PSEUDO-GALATHEA, Peach, 1882; *Trans. Royal Soc. Edinb.*, vol. 30, p. 513.

SCHIZOPODA.

GAMPSOXYX, Meyer, 1847; Verhandl. Nat. Vereins Preuss., Jahrgang iv, p. 86.

PALÆOCARIS, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 48.

NEOTOTELSON, Brocchi, 1880; Bull. Soc. Geol. France, 3d series, vol. 8, No. 1.

AMPHIPODA.

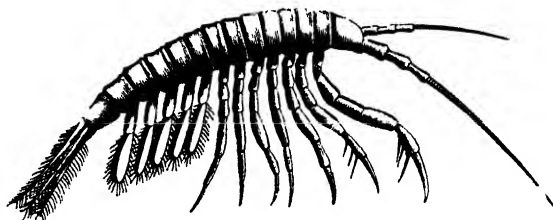
DIPLOSTYLUS, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 76.

STOMAPODA.

AMPHIPELTIS, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 75.

II. ANNOTATED CATALOGUE OF THE AMERICAN SPECIES.

Acanthotelson, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila. vol. 17, p. 46. Geol. Survey Illinois, vol. 2, 1866, p. 389. Type *A. Stimpsoni*, M. & W.



Acanthotelson Eveni, Meek & Worthen, 1868, Am. Jour. Sci., 2d series, vol. 46, p. 28. Coal Measures.

Eveni, Meek & Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 551, figs. a, b, c, d.

Eveni, White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 177, pl. 38, figs. 4, 5, 6, 7.

Eveni, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 125.

inequalis; See *Palæocaris typus*.

? *magister*, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 127, pl. 1, fig. 2, pl. 2, figs. 4, 5. Carboniferous.

Stimpsoni, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 47. Coal Measures.

Stimpsoni, Meek & Worthen, 1866; Geol. Survey Illinois, vol. 2, p. 401, pl. 32, figs. 6, 6a-6f.

Stimpsoni, Meek & Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 549, figs. a, b.

Stimpsoni, Woodward, 1881; Geol. Mag., Dec. 2, vol. 8, p. 533, pl. 14, fig. 4.

Stimpsoni, White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 176, pl. 37, figs. 4, 5.

Stimpsoni, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 124.

Packard considers this species to be a young specimen of *A. Eveni*.

Amphipeltis, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 75.

Diagnosis.—"Carapace oblong-oval, rounded in front, and more truncate behind, with a thorax of (probably) 9 segments. 5 of which project beyond the carapace, and 4 are concealed beneath it. Tail-piece semi-circular, as wide as the abdomen, and as long as the last three segments taken together."

paradoxus, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 76, fig. 11, a, b.

paradoxus, Dawson, 1878; Acadian Geology, p. 523, fig. 180. Devonian.

paradoxus, Salter and Woodward; Chart of Fossil Crustacea, pl. 3, fig. 3.

Anthraconites, Meek & Worthen, 1868; Am. Jour. Sci., 2d series, vol. 46, p. 21.

See *Eurypterus*.

Mazonensis, Meek & Worthen; see *Eurypterus Mazonensis*.

Anthrapalæmon, Salter, 1861; Quart. Jour. Geol. Soc. London, vol. 17, p. 529. Type *A. Grossarti*, Salter.

gracilis, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 50. Coal Measures.

gracilis, Meek & Worthen, 1866; Geol. Survey Illinois, vol. 2, p. 407, pl. 32, figs. 4, a, b, c.

gracilis, Meek & Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 554, figs. a, b.

gracilis, White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 180, pl. 38, figs. 8, 9.

gracilis, Packard, 1881; Am. Naturalist, vol. 19, p. 880.

gracilis, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 135, pl. 4, figs. 1, 2, 3, 5, 6; pl. 7, figs. 3, 4, 5, 6.

(*Palæocarabus*) *Hillianum*, Dawson, 1878; Supplement Acadian Geology, p. 55, fig. 10: also Geol. Mag., vol. 4, 1877, p. 56, fig. 1. Coal Measures.

Aptychopsis, Barrande, 1872; Syst. Sil. Bohême, Suppl., vol. 1, p. 436.

Archæocaris, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335.

vermiformis, " " " " " " p. 355.

Carboniferous.

Aristozoe, Barrande, 1872; Syst. Sil. Bohême, Suppl. vol. 1, p. 474.

rotundata, Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 193, pl. 1, fig. 9. Cambrian.

Troyensis (Ford), Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 193, pl., fig. 8.

Leperditia Troyensis, Ford, 1873; Am. Jour. Sci., 3d series, vol. 6, p. 138.

Cambrian.

Aristozoe sp.? Shaler & Foerste, 1888; Bull. Mus. Comp. Zoology, vol. 16, p. 35, pl. 2, fig. 18. Cambrian.

Belinurus, Kœnig, 1820; *Icones Fossilium Scutiles*, pl. 18, fig. 230.

Gen. Char.—*Belinurus* (Kœnig) Bailey. "General form suborbicular.

Head or cephalic shield semicircular, slightly arched; the central portion (glabella?) prominent and declining towards the circumference surrounded with a flattened margin, and terminating at its posterior angles in long spines. Body composed of 5 segments which terminate in spines and diminish gradually towards the posterior extremity. Tail or caudal portion small, with a few slightly radiating divisions, to which is articulated an elongated spine (*telson*).'' Bailey, *Annals & Mag. Nat. Hist.*, 3d series, London, vol. 11, 1863.

Danæ, Meek & Worthen, 1865; *Proc. Acad. Nat. Sci. Phila.*, vol. 17, p. 43; see *Prestwichia*.

Lacœi, Packard, 1885; *Am. Naturalist*, vol. 19, p. 292. Carboniferous.

Lacœi, Packard, 1886; *Mem. Natl. Acad. Sci.*, vol. 3, p. 149, pl. 5, fig. 5.

Beyrichia, McCoy, 1846; *Silurian Fossils Ireland*, p. 58. Type *Beyrichia Klodeni*, McCoy.

Gen. Char.—Bivalve, "rotundate-quadrate or longitudinally oblong, ends unequal; anterior, posterior, and dorsal margins convex, and surrounded by a sharply-defined, narrow, tumid border or rim; ventral margin simple, straight, or concave; sides tumid, strongly divided into lobes by very deep, nearly vertical furrows extending from the ventral more or less towards the dorsal margin." McCoy, *Brit. Palæozoic Fossils*, p. 135.

æquilatera, Hall, 1860; *Canadian Naturalist*, vol. 5, p. 158, fig. 20.

Silurian.

æquilatera, Dawson, 1868; *Acadian Geology*, p. 609, fig. 217.

Atlantica, Billings, 1865; *Palæozoic Fossils*, vol. 1, p. 300. Quebec.

bela, Walcott, 1883; *Desc. new species Trenton group*, p. 7, pl. 17, figs. 11, 11 a. Trenton.

bela, Walcott, 1884; 35th Rept. New York State Mus. *Nat. Hist.*, p. 213, pl. 17, figs. 11, 11 a.

Chambersi, Miller, 1874; *Cincinnati Quart. Jour. Sci.*, vol. 1, p. 234, fig. 27. Hudson River.

Chambersi, Hall & Whitfield, 1875; *Pal. Ohio*, vol. 2, p. 104, pl. 4, figs. 11, 12.

ciliata, Emmons, 1855; *American Geology*, vol. I, pt. 2, p. 219, fig. 74 c. Hudson River.

ciliata, Miller, 1875; *Cincinnati Quart. Jour. Sci.*, vol. 2, p. 351.

Compare *B. tumifrons*, Hall.

Cincinnatiensis, Miller, 1875; *Cincinnati Quart. Jour. Sci.*, vol. 2, p. 350, fig. 25. Hudson River.

Cincinnatiensis, Walcott, 1876; *Trans. Albany Inst.*, vol. 10, p. 23.

clathrata, Jones, 1858; *Annals and Mag. Nat. Hist.*, London, 3d series, vol. 1, p. 242, pl. 9, fig. 1. Niagara.

Dagon, Clarke, 1885; *Bull. U. S. Geol. Survey*, No. 16, p. 29, pl. 2, figs. 6, 7. Genesee Shales.

- decora*, Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 67.
Duryi, Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 232, figs. 24, 25.
 Hudson River.
- fœtoidea*, White & St. John, 1868; Trans. Chicago Acad. Sci., vol. 1, p. 126.
 figs. 11 a, b.
- granulosa*, Hall, 1876; 28th Rept. New York State Mus. Nat. Hist., Doc.
 Ed. Expl. 32, fig. 4. Niagara.
- granulosa*, Hall, 1876; 28th Rept. New York State Mus. Nat. Hist., p. 186,
 pl. 32, fig. 4.
- granulosa*, Hall, 1883; 11th Ann. Rept. Dept. Geol. Nat. Hist. Indiana,
 p. 331, pl. 34, fig. 4.
- granulata*, Hall, 1859; Pal. New York, vol. 3, p. 377, pl. 79 b, figs. 1 a-d.
 Lower Helderberg.
- Jonesii*, Dawson, 1868; Acadian Geology, p. 313, fig. 132. Carboniferous.
- Agnostus latus*, Vanuxem, 1842; Geology New York, 3d Geol. Dist., p. 80.
 Clinton.
- Beyrichia lata*, Hall, 1859; Pal. New York, vol. 2, p. 301, pl. A 66, figs. 10 a-c.
- lata*, Jones, 1858; Notes on Palæozoic Entomostraca, No. 2, p. 168, pl. 6,
 fig. 13.
- lithofactor*, White & St. John; Prelim. notice new genera and species of
 Fossils, May 8, 1867, p. 2. Coal Measures.
- lithofactor* var. *velata*, ditto, p. 2.
- petrifactor*, White & St. John; Trans. Chicago Acad. Sci., vol. 1, p. 125.
- petrifactor* var. *velata*, ditto, p. 126.
- Logani*, Jones, 1858; Annals and Mag. Nat. Hist., London, 3d series,
 vol. 1, p. 244, pl. 9, figs. 6-10. Chazy.
- Logani*, Jones, 1858; Geol. Survey Canada, Dec. 3, p. 91, pl. 11, figs. 1-5.
- Logani* var. *reniformis*, Jones; ditto, p. 91, pl. 11, fig. 1.
- Logani* var. *leperditoides*, Jones; ditto, p. 91, pl. 11, fig. 5.
- Maccoyana*, Jones, 1855; Annals & Mag. Nat. Hist. London, vol. 16, p. 88,
 pl. 5, fig. 14. Onondaga.
- Maccoyana*, Jones, 1858; ditto, 3d series, London, vol. 1, p. 252, pl. 10,
 fig. 15.
- Maccoyana*, Jones, 1858; Geol. Survey Pennsylvania, vol. 2, p. 834,
 fig. 695.
- Nova Scotica*, Jones & Kirkby, 1884; Geol. Mag., 3d series, vol. 1, p. 357,
 pl. 12, figs. 5, 6. Carboniferous.
- Beyrichia* sp.? Dawson, 1868; Acadian Geology, p. 256, fig. 78 c.
- notata*, Hall, 1859; Pal. New York, vol. 3, p. 379, pl. 79 b, figs. 3 a, b, c.
 Lower Helderberg.
- notata*, var. *ventricosa*, Hall, 1859; ditto, p. 380, pl. 79 b, figs. 4 a, b, c.
- (*Primitia*) *occidentalis*, Walcott, 1884; Pal. Eureka Dist., Mon. U. S.
 Geol. Survey, No. 8, p. 104, pl. 17, figs. 4, 4 a. Devonian.
- oculifera*, Hall, 1871; Pamphlet Cincinnati group, p. 8. Hudson River.
- oculifera*, Hall, 1872; 24th Rept. New York State Mus. Nat. Hist., p. 232,
 pl. 8, figs. 9, 10.

oculifera, Hall & Whitfield, 1875; Pal. Ohio, vol. 2, p. 103, pl. 4, figs. 9, 10.
 oculifera, Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 118.
 oculina, Hall, 1859; Pal. New York, vol. 3, p. 378, pl. 79 b, figs. 2 a-e.

Lower Helderberg.

Pennsylvanica, Jones, 1858; Annals & Mag. Nat. Hist. London, 3d series,
 vol. 1, p. 253, pl. 10, figs. 16, 17, 18. Onondaga.

Pennsylvanica, Jones, 1858; Geol. Survey Pennsylvania, vol. 2, p. 834,
 figs. 696.

petrifactor, White & St. John; see *Beyrichia lithofactor*.

petrifactor, var. *relata*, White & St. John; see *Beyrichia lithofactor*, var. *velata*.

persulcata, Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 12,
 pl. 7, fig. 6. Hudson River.

plagosa, Jones, 1858; Annals & Mag. Nat. Hist. London, 3d series, vol. 1,
 p. 243, pl. 9, fig. 2. Niagara.

punctulifera, Hall, 1861; Desc. new species Fossils, p. 83. Hamilton.

punctulifera, Hall, 1862; 15th Rept. New York State Cab. Nat. Hist. p. 111.

pustulosa, Hall, 1860; Canadian Naturalist, vol. 5, p. 157, fig. 19.

Silurian.

pustulosa, Dawson, 1868; Acadian Geology, p. 608, fig. 216.

quadrilirata, Hall & Whitfield, 1875; Pal. Ohio, vol. 2, p. 105, pl. 4,
 figs. 6, 7. Hudson River.

quadrilirata, Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 351.

regularis, Emmons, 1855; American Geology, pt. 2, p. 219, fig. 74 b.

Hudson River.

regularis, Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 351.

Compare *B. quadrilirata*, Hall & Whitfield.

reniformis, Jones, 1858; Geol. Survey Canada, Dec. 3, p. 91, pl. 11, fig. 1.

See *B. Loganii*.

Chazy.

Richardsoni, Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 347,
 fig. 40. Hudson River.

rugulifera, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London,
 vol. 1, p. 242, pl. 9, fig. 4. Niagara.

sigillata, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1,
 p. 242, pl. 9, fig. 5. Niagara.

simplex (Jones) Emmons, 1855; Am. Geology, vol. I, pt. 2, p. 218, fig. 74 a.
 Hudson River.

Cytherina spinosa, Hall, 1852; Pal. New York, vol. 2, p. 317, pl. 67, figs. 17-20.
 Niagara.

striato-marginatus, Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1,
 p. 233, fig. 26. Hudson River.

symmetrica, Hall, 1852; Pal. New York, vol. 2, p. 317, pl. 67, fig. 16.

Niagara.

trisulcata, Hall, 1859; Pal. New York, vol. 3, p. 381, pl. 79, figs. 5 a, b.
 Lower Helderberg.

tumifrons, Hall, 1871; Desc. new species Foss. Hudson River group, p. 7.

tumifrons, Hall, 1872; 24th Rept. New York State Mus. Nat. Hist.,
 p. 231, pl. 8, fig. 11. Hudson River.

tumifrons, Hall & Whitfield, 1875; Pal. Ohio, vol. 2, p. 102, pl. 4, fig. 8.
tumifrons, Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 119.
venusta, Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 68.

Carbonia, Jones & Kirby, 1879; Annals & Mag. Nat. Hist., 5th series, London, vol. 4, p. 28.

Diagnosis.—Subovate or elongate in outline, with the dorsal margin rounded and the ventral margin nearly straight; valves convex, the right rather the larger and overlapping the left ventrally; hinge simple; muscle-spot circular; surface smooth, sometimes pitted.

? *Bairdioides* (?), Jones & Kirkby, 1884; Geol. Mag., 5th series, London, vol. 1, p. 358, pl. 12, figs. 8 a-d. Carboniferous.

Bairdia sp.? Dawson, 1868; Acadian Geology, p. 206, fig. 48 a?

Cythere? (*Carbonia*), Bairdioides, Jones & Kirkby, 1879; Annals & Mag. Nat. Hist., 5th series, London, vol. 4, p. 38, pl. 3, figs. 24, 27.

Carbonia? Bairdioides? Jones & Kirkby, 1884; Geol. Mag., Dec. 3, p. 358, pl. 12, figs. 8 a-d.

? *elongata*, Jones & Kirkby, 1884; Annals & Mag. Nat. Hist., 5th series, London, vol. 1, p. 361, pl. 12, fig. 10. Carboniferous.

? *elongata*, Jones & Kirkby, 1884; Geol. Mag., Dec. 3, p. 361, pl. 12, fig. 10.

fabulina, Jones & Kirkby, 1879; Annals & Mag. Nat. Hist., 5th series, London, vol. 4, p. 31, pl. 2, figs. 1-9; and var. *humilis*, id., figs. 11-14.

fabulina, Jones, 1889; Geol. Mag., Dec. 3, vol. 6, p. 270, figs. 1-4.

Cytherella inflata, Dawson, 1868; Acadian Geology, p. 206, fig. 48 b.

fabulina, Jones & Kirkby, 1884; Geol. Mag., Dec. 3, vol. 1, p. 358, pl. 12, figs. 9 a-e.

Ceratiocaris, McCoy, 1849; Annals & Mag. Nat. Hist., London, vol. 4, p. 412.

Gen. Char.—Carapace bivalve, the dorsal line simply angulated (?undivided), with a slight furrow beneath it on each side; sides semielliptical, much elongated from before backwards, evenly convex, ventral margin gently convex, posterior end abruptly truncated obliquely; on each side near the anterior end considerably below the hinge-line is an ocular (?) spot sometimes raised and distinct, in some species flat; surface marked with fine, imbricated striæ, obliquely longitudinal. (McCoy, Contrib. Pal., p. 151.)

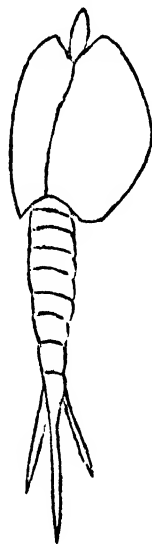
aculeatus, Hall, 1859; Pal. New York, vol. 3, p. 422*, pl. 80 a, fig. 10. Waterlime.

acuminatus, Hall, 1859; Pal. New York, vol. 3, p. 422*, pl. 84, fig. 6. Waterlime.

acuminatus, Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 28, pl. 3, fig. 2.

armatus, Hall, 1863; see *Echinocaris punctata*.

Beecheri, Clarke, 1881; Bull. U. S. Geol. Survey, No. 16, p. 44, pl. 2, fig. 1. Devonian.



- Beecheri, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 104, pl. 31, fig. 3.
(*Colpocaris*) Bradleyi, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23,
p. 332. Lower Carboniferous.
- Onchus* Deweyi, Hall, 1852; Pal. New York, vol. 2, p. 320, pl. 71, figs. 1 a-d.
Niagara.
- (*Colpocaris*) elytroides, Meek, 1871; Proc. Acad. Nat. Sci. Phila., p. 334.
Lower Carboniferous.
- grandis, Pohlman, 1881; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 19, fig. 5.
Waterlime.
- longicaudus, Hall, 1863; 16th Rept. New York State Cab. Nat. Hist.,
p. 73, pl. 1, fig. 7, not figs. 4, 5, 6. Hamilton.
- longicaudus, Packard, 1883; 12th Ann. Rept. U. S. Geol. Survey Terri-
tories, p. 450.
- longicaudus, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 1.
- longicaudus, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Foss.
Phyllopoda, p. 35.
- longicaudus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 163, pl. 31,
fig. 1.
- not *C. longicaudus*, Clarke, Bull. U. S. Geol. Survey, No. 16, 1885, p. 20.
- Maccoyana, Hall, 1859; Pal. New York, vol. 3, p. 421*, pl. 84, figs. 1-5.
Waterlime.
- ? *punctatus*, Hall; see *Echinocaris punctata*.
- ? *sinuata*, Meek & Worthen, 1868; Am. Jour. Sci., 2d series, vol. 46, p. 22.
Coal Measures.
- ? *sinuata*, Meek & Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 540,
fig. a.
- simplex, Clarke, 1885; Bull. U. S. Geol. Survey No. 16, p. 43, pl. 2, fig. 2.
Devonian.
- ? simplex, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 165, pl. 31,
fig. 2.
- (*Solenocaris*) strigata, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23,
p. 335. Lower Carboniferous.
- (*Solenocaris*) strigata, Meek, 1875; Pal. Ohio, vol. 2, p. 321, pl. 18,
figs. 4 a, b, c.
- Crangopsia**, Salter, 1863; name changed from *Palæocrangon*.
- Cryptozoe**, Packard, 1886; Proc. Am. Philos. Soc. vol. 23, p. 381.
- Gen. Char.*—"The generic characters as drawn from the carapace alone
are as follows: Valves $\frac{1}{2}$ as long as broad; moderately full and con-
vex, with no definite straight hinge-margin. It differs from *Ceratiocaris*
in the lack of a long straight hinge-margin, the dorsal edge being
curved, and in the lower edge not being thickened, while the posterior
end is well rounded. The anterior end of the valves is about $\frac{1}{2}$ as wide
as the posterior end, and is oblique, the lower part of the edge being
directed outwards."
- problematicus, Packard, 1886; Proc. Am. Philos. Soc., vol. 23, p. 382,
fig. 3, and plate. Carboniferous.

Cyclus, De Koninck, 1841; Mém. Acad. Sci. Bruxelles, vol. 14, p. 18.

The following description of the typical species, *C. radialis*, is given by Dr. Woodward (Geol. Mag., vol. 7, 1870, No. 12, p. 557):—"Carapace, five lines long by four lines in breadth; its general form is hemispherical, with a narrow smooth border (roundly indented behind, so as to leave a rudimentary medial spine in the centre); the shield is divided down its centre by a raised longitudinal (dorsal) ridge, from which radiate 7 diverging ribs (transversely wrinkled), whose rounded extremities reach the lateral and posterior border."

Americana, Packard, 1885; Am. Naturalist, vol. 19, p. 293.

Coal Measures.

Americana, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 143, pl. 5, figs. 1, 1a; pl. 6, figs. 4, 4a.

Cythere, Müller, 1785; Entomostraca, p. 64.

"Valves unequal, oblong-ovate to quadrate, smooth or rough, mostly highest in front; hinge with teeth and sockets at anterior and posterior angles, variously developed." (Jones, Proc. Geol. Assoc., vol. 9, No. 7, p. 19.)

(*Beyrichia*) *Americana*, Shumard, 1858; Trans. Acad. Sci. St. Louis, vol. 1, p. 227.

Upper Coal Measures.

carbonaria, Hall; see *Leperditia carbonaria*.

crassimarginata, Winchell, 1862; Proc. Acad. Nat. Sci. Phila., p. 429.

Marshall.

Cincinnatiensis, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 331.

Hudson River.

Cincinnatiensis, Meek, 1873; see *Entomis Cincinnatiensis*.

irregularis, Miller, 1878; Jour. Cincinnati Soc. Nat. Hist., vol. 1, p. 106, pl. 3, figs. 7, 7a.

Hudson River.

Nebrascensis, Geinitz, 1866; Carb. und Dyas in Nebraska, p. 2, pl. 1, fig. 2.

Nebrascensis, Meek, 1872; Rept. U. S. Geol. Survey Territories, Final Rept. Nebraska, p. 237, pl. 11, figs. 2, 3a, b.?

Coal Measures.

Okeni; see *Leperditia Okeni*.

Ohiones, Herrick, 1889; Bull. Den. Univ., vol. 4, p. 60, pl. 8, fig. 8; vol. 3, pl. 3, fig. 19.

Waverly.

simplex, White & St. John, 1867; Prelim. notice new species Foss., p. 3.

simplex, White & St. John, 1868, Trans. Chicago Acad. Sci., vol. 1, p. 127.

St. Louis.

Cythere sp.? Dawson, 1868; Acad. Geol., p. 256, fig. 78a. Carboniferous.

sublavis; see *Leperditia sublavis*.

subrecta; see *Leperditia subrecta*.

Cytherina, Lamarck, 1818; Animaux Sans Vert. vol. 5, p. 125.

alta; see *Leperditia alta*.

crenulata, Emmons, 1855; Am. Geology, vol. 1, p. 221, figs. 75a, b, c, d.

Trenton.

cylindrica; see *Isochilina cylindrica*.

Emmonsii, Vogdes, 1889; Annals N. Y. Acad. Sci., vol. v, No. 1; to replace

C. subcylindrica, q. v.

Trenton.

spinosa; see *Beyrichia spinosa*.

subcylindrica, Emmons, 1855; Am. Geology, vol. 1, p. 220, fig. 75 b.

Trenton. Pre-occupied by Münster; change to *C. Emmonsii*.

subelliptica, Emmons, 1855; Am. Geology, vol. 1, p. 220, fig. 75 a.

Trenton.

Cytherellina, Jones & Holl, 1869; Annals & Mag. Nat. Hist. 4th series, London, vol. 3, p. 215.

Diagnosis.—Carapace valves elongate, convex, smooth, thick, excavated internally with undulating contours.

grandella, Whitfield, 1882; Bull. Am. Mus. Nat. Hist. New York, vol. 1, p. 94, pl. 9, figs. 28, 29. Warsaw.

Cytheropsis, McCoy, 1855; Synopsis Classification Brit. Pal. Rocks, pl. 1 L, fig. 2. No definite description of the genus given.

concinna, Jones; see *Primitia concinna*.

rugosa, Jones; see *Primitia rugosa*.

siliqua, Jones, 1858; Annals & Mag. Nat. Hist. 2d series, London, vol. 1, p. 249, pl. 10, fig. 6. Trenton.

siliqua, Jones, 1858; Geol. Canada, Dec. 3, p. 99.

siliqua, Jones, 1869; Annals & Mag. Nat. Hist. 4th series, London, vol. 3, p. 216, pl. 14, figs. 1, 2, 3, 4, 5, 6.

Dipeltis, Packard, 1885; Am. Naturalist, vol. 19, p. 293.

Gen. Char.—"The body is suborbicular, flattened, disk-like, sloping regularly and gradually from the median area to the edge; it is divided into two portions; the larger one the cephalic shield, and the other as the abdomen. The edge of the body is very slightly emarginate. The integument is rather thin, without segments; its surface may have had a few scattered small tubercles. The surface is smooth and shining."

diplodiscus, Packard, 1885; Am. Naturalist, vol. 19, p. 293.

Carboniferous.

diplodiscus, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 145, pl. 5, figs. 2, 2 a.

Diplostylus, Salter; Quart. Jour. Geol. Soc. London, vol. 19, p. 76.

Gen. Char.—"Carapace unknown. Body-segments (in number?) arched and with minute pleuræ. Tail-segment large triangular, spinose, with two pairs of simple, ovate appendages." (Salter, Quart. Jour. Geol. Soc., vol. 19, p. 76.) Type *C. Dawsoni*, Salter.

Dawsoni, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 77, fig. 6.

Coal Measures.

Dipterocaris, Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 121.

Diagnosis.—Carapace in one piece, ovate in general outline; normally with an elevated dorsum and sloping sides. Each extremity is strongly notched, dividing the carapace into two broad alæ connected by a narrow isthmus, which shows no evidence of a dorsal suture or anchylosis. Surface ornamented by concentric elevated lines or wrinkles. (Clarke, Pal. New York, vol. 7, p. lix.)

pennæ-dædali, Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 122, fig. 1. Chemung.

pennæ-dædali, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 349.

pennæ-dædali, Etheridge, Woodward & Jones, 1884; 2d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 11.

pennæ-dædali, id., 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 3.

pennæ-dædali, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 200, pl. 35, fig. 24.

pennæ-dædali, Etheridge, Woodward, & Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 9.

pes-cervæ, Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, 123, figs. 4, 5. Chemung.

pes-cervæ, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 349.

pes-cervæ, Etheridge, Woodward, & Jones, 1884; 2d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 11.

pes-cervæ, id., 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 3.

pes-cervæ, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 202, pl. 35, figs. 20, 21.

pes-cervæ, Etheridge, Woodward, & Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 9.

procne, Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 122, figs. 2, 3. Chemung.

procne, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 349.

procne, Etheridge, Woodward & Jones, 1884; 2d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 11.

procne, id., 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 3.

procne, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 201, pl. 35, figs. 25-27.

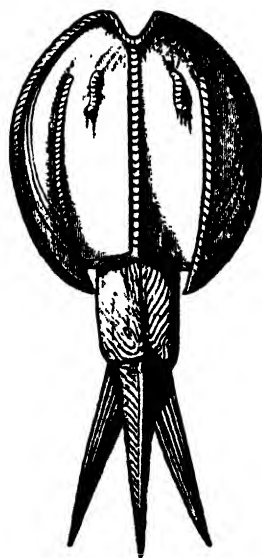
procne, Etheridge, Woodward, & Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 9.

Dithyrocaris (Sculer, 1843, MSS.), Portlock; Rept. Geol. Londonderry, p. 313.

Diagnosis.—Carapace subquadrate in outline, bivalvular, the valves being connected by a simple, straight hinge-line, and gaping at the anterior extremity forming the rostral cleft. Rostrum unknown, each valve bearing a single gently curved carina. Optic node generally conspicuous. Abdomen composed of ? segments of which one is naked. Post-abdomen consisting of caudal plate and three caudal spines.

Belli, Woodward, 1870; Geol. Mag., Dec. 2, vol. 8, p. 106, pl. 3, figs. Devonian.

Belli, Etheridge, Woodward, & Jones, 1887; 5th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 6.



Belli, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 194.

carbonarius, Meek & Worthen, 1870; Proc. Acad. Nat. Sci. Phila., vol. 22, p. 55. Coal Measures.

carbonarius, id., 1873; Geol. Survey Illinois, vol. 5, p. 618, pl. 32, fig. 1.

carbonarius, White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 178, pl. 39, fig. 2.

Neptuni, Hall; see *Mesothyra Neptuni*.

Dolichopterus (subgenus *Eurypterus*), Hall, 1859; Pal. New York, vol. 3, p. 414*.

macrocheirus, Hall, 1859; Pal. New York, vol. 3, p. 414*, pl. 83, fig. 1; pl. 83 a, fig. 1. Waterlime.

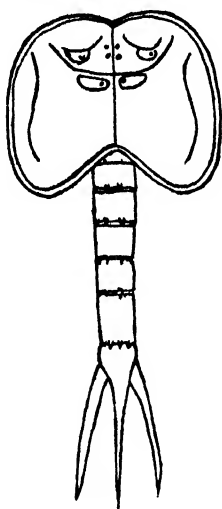
Dolichocephala, Claypole, 1883; Proc. Am. Philos. Soc., vol. 21, p. 236.

Lacoana, id., p. 236, plate.

Catskill.

Referred to *Stylonurus excelsior*.

Echinocaris, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 34.



Diagnosis.—Carapace bivalvular, each valve oblique by subovate in outline; hinge-line straight and shorter than the greatest length of the shield. Anterior extremities slightly gaping, posterior extremities somewhat produced, incurved, or truncate. Rostrum absent or not observed. The cephalic and anterior portion of the thoracic area marked by various regularly and symmetrically arranged nodes, two of which bear the optic spots. Nuchal furrow more or less distinct. The thoracic portion of each valve bears one or two longitudinal, somewhat curving lateral ridges or carinæ. Abdomen naked, composed, so far as known, of 6 somites, which are furnished with short spinules or prickles on their dorsal surface. Caudal plate short and produced into a stout telson. Lateral spines or cercopods narrow and longer than the

telson. (Hall & Clarke, Pal. New York, vol. 7, p. liv.)

condylepis, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 173, pl. 29, figs. 14–17. Chemung.

multinodosa, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 38, pl. o, fig. 8 (plate only with special author's ed.). Erie shales.

multi-nodosa, Packard, 1882; Am. Naturalist, p. 952, fig. 10.

multinodosa, Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451, fig. 71 a.

multinodosa, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 5.

multinodosa, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.

multinodosa, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 180, pl. 29, figs. 18, 19.

- multinodosa, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.
- Ceratiocaris*? punctatus, Hall, 1863; 16th Rept. N. Y. State Cab. Nat. Hist., p. 74, pl. 1, fig. 8. Hamilton.
- Ceratiocaris armatus*, Hall, 1863; 16th Rept. N. Y. State Cab. Nat. Hist., p. 72, pl. 1, figs. 1-3.
- Ceratiocaris armatus*, Hall, 1876; Illust. Devonian Foss., pl. 23, figs. 4, 5.
- Ceratiocaris (Aristozoe) punctatus*, Hall, 1876; id., pl. 23, fig. 7.
- Echinocaris punctatus*, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 37.
- punctatus, Packard, 1882; Am. Naturalist, p. 952, fig. 12.
- punctatus, Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 450, fig. 70.
- armatus, Packard, 1883, id., p. 451.
- punctatus, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 6, pl. 1, figs. 13-16; also fig. 1 in text, p. 4.
- armatus, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 2, pl. 13, fig. 2.
- armatus, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.
- punctatus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 166, pl. 27, fig. 10; pl. 28, figs. 1-7; pl. 29, figs. 1-8.
- punctata, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.
- pustulosa, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 38. Erie shales.
- pustulosa, Whitfield, 1880; Author's edition, p. 38, plate, fig. 7.
- pustulosa, Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451.
- pustulosa, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 5.
- pustulosa, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 2, pl. 13, fig. 6.
- pustulosa, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.
- pustulosa, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 178, pl. 29, figs. 9, 10.
- pustulosa, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.
- socialis, Beecher, 1884; 2d Geol. Survey Penna., vol. PPP, p. 10, pl. 1, figs. 1-12. Chemung.
- socialis, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.
- socialis, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 174, pl. 30, figs. 1-12.
- socialis, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda, p. 8.
- sublevis, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 36, plate, figs. 4-6 (plate only with author's edition). Erie shales.

sublevis, Packard, 1882; Am. Naturalist, p. 952, fig. 11.

sublævis, Packard, 1883; 12th Rept. U. S. Geol. Survey Terr., p. 450, fig. 71 b.

sublevis, Beecher, 1884; 2d Geol. Survey Penna., vol. PPP, p. 5.

sublævis, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 2, pl. 13, figs. 3, 4, 5.

sublævis, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.

sublævis, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 176, pl. 29, figs. 11-13.

sublevis, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda, p. 8.

Whitfieldi, Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 45, pl. 2, figs. 3, 4. Portage.

Whitfieldi, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 172, pl. 29, figs. 20, 21.

Whitfieldi, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda, p. 8.

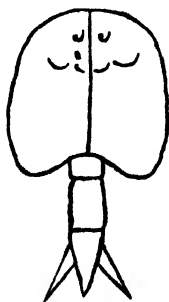
Echinognathus, Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 213.

Gen. Char.—Endognathary limbs (one or more pairs) formed of 8 or 9 joints, 6 of which carry long backward-curving spines articulated to their posterior side. Terminal joint slender, elongate, acuminate. Surface of the body, and larger joints of the cephalic appendage ornamented with scale-like markings as in the genus *Pterygotus*. Type *E. Clevelandi* (Walcott, Am. Jour. Sci., 3d series, vol. 23).

Clevelandi, Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 213, figs. 1, 2. Utica Slates.

Eurypterus? Clevelandi, Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 151.

Elymocarid, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 13.



Diagnosis.—Carapace bivalvular, hinge-line straight and extending nearly the entire length of the valves. Outline elongate-subquadrangular or sub-ovate. Surface gently and evenly convex. Cephalic region smooth or marked by two low broad nodes; optic node usually distinct. Rostrum absent or not observed. Abdomen composed of 2 naked segments. Post-abdomen with a very short caudal plate to which are articulated a broad, convex, and rapidly tapering telson, and two short lateral spines, which are crenulated along their inner margins for the attachment of the setæ. (Hall &

Clarke, Pal. New York, vol. 7, p. 1v.)

capsella, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 181, pl. 31, fig. 4. Hamilton.

siliqua, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 13, pl. 2, figs. 1, 2. Chemung.

siliqua, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.

siliqua, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 182, pl. 31, figs. 5, 6.

siliqua, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 8.

Entomis, Jones, 1861; Mem. Geol. Survey Scotland, Expl. Map 32, p. 137: also Annals & Mag. Nat. Hist., 4th series, London, vol. 11, p. 413.

Gen. Char.—Carapace convex, suboblong, ovate-oblong, or subreniform, more or less constricted dorsally by a transverse furrow across the hinge-line; in front of the furrow there is sometimes a tubercle—variable in position and shape; surface either smooth or (most commonly) ornamented with raised lines or riblets, arranged in a definite pattern—transverse, longitudinal, or concentric; the anterior margin is without sinus and notch. (Jones & Kirby, Proc. Geol. Assoc., vol. 9, No. 7, p. 7.)

Cythere Cincinnatiensis, Meek, 1871; Proc. Acad. Nat. Sci. Phila., p. 331.

Hudson River.

Cythere Cincinnatiensis, Meek, 1872; Pal. Ohio, vol. 1, p. 158, pl. 14, figs. 1a-1d.

Cythere Cincinnatiensis, Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 120.

Entomis Cincinnatiensis, Jones, 1884; Annals & Mag. Nat. Hist. 5th series, London, vol. 14, note, p. 395.

Equisetides Wrightiana. This species is referred by Woodward & Jones, 3d Rept. Comm. Fossil Phyllopoda, Brit. Assoc., 1885, p. 360, to *Echinocaris*. Prof. Hall placed it provisionally with *Stylonurus*, which see.

Estheria, Ruffell, 1857; Mus. Senckenberg, vol. 2, p. 119.

Diagnosis.—Carapace bivalvular, the outline of each valve being sub-circular, obliquely oval, or subquadrate. Beaks generally anterior, sometimes subcentral. Dorsal or hinge-line straight, shorter than the greatest length of the valves. Surface rarely smooth, usually with concentric lines of growth, the interstitial spaces being often ornamented with a fine punctate or reticulate sculpture. Test very thin. (Hall & Clarke, Pal. New York, vol. 7, p. lxi.)

Dawsoni, Jones, 1870; Geol. Mag., vol. 7, p. 220, pl. 9, fig. 15.

Carboniferous.

Dawsoni, Jones, 1878; Geol. Mag. Dec. 2, vol. 2, p. 101, pl. 3, fig. 2.

Estheria sp.? Dawson, 1868; Acadian Geology, p. 256, fig. 78 d.

Dawsoni, Jones & Kirkby, 1884; Geol. Mag., Dec. 3, vol. 1, p. 361, pl. 12, fig. 12.

pulex, Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 476, plate, fig. 4. Hamilton.

pulex, Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 355.

pulex, Etheridge, Woodward & Jones, 1887; 5th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 10.

pulex, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 206, pl. 35, figs. 10, 11.

pulex, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 9.

Euproops, Meek, 1867; Am. Jour. Sci., 2d Series, vol. 34, p. 394. See *Belinurus* and *Prestwichia*.

Eurypterus, De Kay, 1825; Annals Lyceum Nat. Hist. N. Y., vol. 1, pt. 2, p. 375.

Diagnosis.—Body elongate. Cephalon about $\frac{1}{2}$ the length of the body, subquadrate in outline, gently convex. Eyes large, reniform, situated somewhat anteriorly, and within them lie two ocular punctæ or ocelli. Oral aperture surrounded by 5 pairs of cephalic appendages in front of which is a pair of minute antennules. The first 3 pairs of appendages or gnathopods are of approximately the same length, the joints of the 4th pair being more elongate, and the 5th pair being developed into powerful swimming appendages, the last two segments of which are very broad and flat. Behind the mouth lies an oval plate (*metastoma*). Abdomen upon the dorsal side composed of 6 segments, the first of which corresponds to the operculum of *Limulus*. Upon the ventral surface there are but 5 segments apparent, all of which are divided by a median suture, the first two bearing median processes extending posteriorly. The first segment also bears a series of symmetrically arranged median plates, which may be connected with the genital apparatus. Post-abdomen composed of 6 tapering segments and a long slender caudal spine. (Hall & Clarke, 1888; Pal. New York, vol. 7, p. 1.)

Beecheri, Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 30, pl. 3, fig. 1. Chemung.

Beecheri, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 156, pl. 27, fig. 5.

Beecheri, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 9.

Boylei, Whiteaves, 1884; Pal. Fossils, vol. 3, pt. 1, p. 42, pl. 7, fig. 3.

Guelph.

DeKayi, Hall, 1859; Pal. New York, vol. 3, p. 411*, pl. 82, fig. 1.

Waterlime.

Eriensis, Whitfield, 1881; Annals New York Acad. Sci., vol. 2, p. 196.

Lower Helderberg.

Eusarcus grandis, Grote & Pitt, 1875; Bull. Buffalo Soc. Nat. Sci., vol. 3, p. 17.

Waterlime.

Referred by J. Pohlman (Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 31) to *Eurypterus scorpionis*. An almost similar term, *E. scorpionoides*, was used for a species of this genus by H. Woodward in 1868; we suggest that of *E. Pohlmani* for this species.

giganteus, Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 41, pl. 2, fig. 1. Waterlime.

lacustris, Harlan, 1834; Trans. Geol. Soc. Pennsylvania, vol. 1, p. 98, pl. 5, fig. 2. Waterlime.

- lacustris, Harlan, 1835; Med. Phys. Researches, p. 297, plate, fig. 2.
- lacustris, Hall, 1859; Pal. New York, vol. 3, p. 407*, pl. 81, figs. 1-11;
pl. 81 a, fig. 1; pl. 81 b, figs. 1-5; pl. 83 b, fig. 3; also fig. 5 in text
p. 400*.
- lacustris, var. robustus, Hall, 1859; Pal. New York, vol. 3, p. 410*,
pl. 81 c, fig. 2.
- (*Dolichopterus*) Mansfieldi, Hall, C. E., 1877; Proc. Am. Philos. Soc.,
vol. 16, p. 621. Carboniferous.
- Mansfieldi, Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 32,
pl. 4, figs. 1-8; pl. 5, figs. 1-11; pl. 6, fig. 1; pl. 7, fig. 1; pl. 8, figs. 1-3.
- (*Anthraconetes*) Mazonensis, Meek & Worthen, 1868; Am. Jour. Sci.,
2d series, vol. 46, p. 21. Coal Measures.
- (*Anthraconetes*) Mazonensis, Meek & Worthen, 1868; Geol. Survey Illinois,
vol. 3, p. 544, figs.
- (*Anthraconetes*) Mazonensis, Hall, 1884; 2d Geol. Survey Pennsylvania,
vol. PPP, p. 25, fig. 2; p. 27, fig. 3.
- (*Anthraconetes*) Mazonensis, White, 1884; 13th Ann. Rept. Dept. Geol.
Nat. Hist. Indiana, p. 168, pl. 37, figs. 1, 2, 3.
- microphthalmus, Hall, 1859; Pal. New York, vol. 3, p. 407*, pl. 80 a, fig. 7.
Lower Helderberg.
- pachycheirus, Hall, 1859; Pal. New York, vol. 3, p. 412*, pl. 8, figs. 1-3.
Waterlime.
- Pennsylvanicus, Hall, C. E., 1877; Trans. Am. Philos. Soc. Phila., vol. 7,
p. 621. Carboniferous.
- Pennsylvanicus, Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP,
p. 31, pl. 5, fig. 18.
- Pohlmani, Vogdes, 1889; to take the place of the pre-occupied name of
E. scorponis, Grote & Pitt. Ann. N. Y. Acad. Sci., vol. v, No. 1.
- potens, Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, pl. 4,
figs. 9, 10. Carboniferous.
- prominens, Hall, 1884; Proc. Am. Assoc. Adv. Sci., vol. 33, p. 420.
Clinton.
- prominens, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 157, pl. 27,
figs. 3, 4.
- pulicaris, Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 78,
figs. 9, 10. Coal Measures.
- pulicaris, Dawson, 1868; Acadian Geology, p. 523, figs. 179 a, b.
- pustulosus, Hall, 1859; Pal. New York, vol. 3, p. 413*, pl. 83 b, fig. 1.
Waterlime.
- Eurypterus remipes.** Waterlime.
- Fossil fish, Mitchell, 1818; Am. Monthly Mag., vol. 3, p. 291.
- Eurypterus remipes**, De Kay, 1825; Annals Lyceum Nat. Hist. New York,
vol. 1, p. 375, pl. 29.
- remipes, Harlan, 1834; Trans. Geol. Soc. Pennsylvania, vol. 1, p. 96, pl. 5.
- remipes, Harlan, 1835; Medical Phys. Researches, p. 297, plate, fig. 1.
- remipes, Milne-Edwards, 1840; Hist. Nat. Crust., vol. 3, p. 422.
- remipes, Burmeister, 1843; Org. Trilobiten, p. 62; Ray Soc. Ed. p. 54.

- remipes, Bronn, 1837; *Lethea Geognostica*, vol. 1, p. 666, pl. 9^a, fig. 1; pl. 9, fig. 1.
- remipes, Salter, 1859; *Quart. Jour. Geol. Soc. London*, vol. 15, p. 255.
- remipes, Nieszkowski, 1858; *Der Eurypterus remipes*, plates 1, 2.
- remipes, Hall, 1859; *Pal. New York*, vol. 3, p. 404*, pl. 80, figs. 1-12; pl. 80 a, figs. 1-6; pl. 83 b, fig. 2; also p. 403*, figs. 6, 7.
- remipes. Numerous authors.
- Eusarcus scorpionis*, Grote & Pitt, 1875; *Bull. Buffalo Soc. Nat. Sci.*, vol. 3, p. 1; idem., vol. 3, p. 17; photographic plate. Waterlime.
- scorpionis* (Grote & Pitt), Pohlman, 1886; *Bull. Buffalo Soc. Nat. Sci.*, vol. 5, p. 30, pl. 3, fig. 3. Name pre-occupied: see *E. Pohlmani*.
- Eusarcus grandis* (Grote & Pitt), Pohlman, 1886; *Bull. Buffalo Soc. Nat. Sci.*, vol. 5, p. 31. Referred to *E. Pohlmani*, Vogdes.
- stylus, Hall, 1884; *2d Geol. Survey Penn.*, vol. PPP, p. 34, pl. 5, figs. 12-15. Carboniferous.
- Hymenocaris**, Salter, 1853; *22d Rept. Brit. Assoc. Adv. Sci. Trans.*, p. 56.
- Isochilina**, Jones, 1857; *Mem. Geol. Survey Canada*, Dec. 3, p. 97. *Annals & Mag. Nat. Hist.*, 2d series, vol. 1, p. 248. Type *I. Ottawa*, Jones.
- "Equivalent; the margins of the valves meeting uniformly, not overlapping as in *Leperditia*; greatest convexity of the valves either central or towards the anterior portion. Eye-tubercle present. Muscular spot not distinct externally." (Jones, *Mem. Geol. Sur. Canada*, Dec. 3, p. 97.)
- Leperditia (Isochilina) armata*, Walcott, 1883; *Desc. New Species of Fossils Trenton group*, p. 7, pl. 17, fig. 10. Trenton.
- Leperditia (Isochilina) armata*, Walcott, 1884; *35th Rept. New York State Mus. Nat. Hist.*, p. 213, pl. 17, fig. 10.
- Cytherina cylindrica*, Hall, 1852; *Pal. New York*, vol. 2, p. 14, pl. 4, figs. 8 a, 8 b. Medina.
- Leperditia (Isochilina) cylindrica*, Jones, 1858; *Annals & Mag. Nat. Hist.*, 3d series, vol. 1, p. 253; also *Geol. Survey Canada*, Dec. 3, p. 101.
- Leperditia (Isochilina) cylindrica*, Hall, 1871; *Desc. New Species Fossils Hudson River group*, p. 7. Hudson River.
- Leperditia (Isochilina) cylindrica*, Hall, 1872; *24th Rept. New York State Mus. Nat. Hist.*, p. 231, pl. 8, fig. 12.
- Leperditia (Isochilina) cylindrica*, Hall & Whitfield, 1875; *Pal. Ohio*, vol. 2, p. 101, pl. 4, fig. 5.
- Prof. T. Rupert Jones (*Annals & Mag. Nat. Hist.*, 5th series, London, vol. 14, 1884, p. 344) refers the species from the Medina sandstone to *Leperditia cylindrica*, Hall, and that described in the 24th Rept. New York State Mus. Nat. Hist., p. 231, pl. 8, fig. 12, and *Geol. Survey Ohio*, vol. 2, pt. 2, p. 101, pl. 4, fig. 5, doubtfully to the genus *Primitia*.
- cylindrica*, Miller, 1875; *Cincinnati Quart. Jour. Sci.*, vol. 2, p. 351.
- Leperditia (Isochilina) gracilis*, Jones, 1858; *Annals & Mag. Nat. Hist.*, London, vol. 1, p. 248, pl. 10, fig. 2. Trenton.
- Leperditia (Isochilina) gracilis*, Jones, 1858; *Geol. Survey Canada*, Dec. 3, p. 98, pl. 11, fig. 15.

- Jonesi, Wetherby, 1881; Jour. Cincinnati Soc. Nat. Hist., vol. 4, p. 80,
pl. 2, figs. 7, 7a. Subcarboniferous.
- Leperditia (Isochilina) minutissima*, Hall, 1871; Desc. New Species Fossils
Hudson River group, p. 7. Hudson River.
- Leperditia (Isochilina) minutissima*, Hall, 1872; 24th Rept. New York State
Mus. Nat. Hist., p. 231, pl. 8, fig. 13.
- Leperditia (Isochilina) minutissima*, Hall & Whitfield, 1873; Pal. Ohio, vol. 2,
p. 102, pl. 4, fig. 4.
- Leperditia (Isochilina) Ottawa*, Jones, 1858; Annals & Mag. Nat. Hist., 2d series,
London, vol. 1, p. 248, pl. 10, fig. 1. Chazy.
- Leperditia (Isochilina) Ottawa*, Jones, 1858; Geol. Survey Canada, Dec. 3,
p. 97, pl. 11, fig. 14.
- Ottawa, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London,
vol. 14, p. 345.
- Leaia**, Jones, 1862; Mon. Fossil Estheriæ, p. 115.
- Gen. Char.*—"The carapace-valves are oblong; truncate behind, with a
slight curvature of outline; boldly rounded in front; either straight
or somewhat curved on the ventral border; slightly on the dorsal edge;
a slight umbo takes the place of the antero-dorsal angle, from whence
two conspicuous ridges (hollow within) pass along the surface of the
valve; one directly across the valve to the antero-ventral angle; the
other, and longer one, passes diagonally to the postero-ventral angle;
these ridges divide the convexities of the valves in three, unequal,
triangular, smooth, sloping areas; the anterior space is the smallest
and nearly semi-circular; the middle one has its apex at the umbo,
and its base along the ventral margin; and the posterior space is based
on the hinder margin, and reaches along the dorsal region to the umbo.
The surface of the valve is marked with 10-13? delicate ridges." . . .
(Jones, Mon. Fossil Estheriæ, p. 115. Type *L. Leidyi*, Lea.)
- Cypriocardia Leidyi*, Lea, 1855; Proc. Acad. Nat. Sci. Phila., vol. 7, p. 341, pl. 4.
Coal Measures.
- Leidy, Jones, 1862; Mon. Fossil Estheriæ, p. 116, pl. 5, figs. 11, 12.
- Leidy, Dawson, 1868; Acadian Geology, p. 256, fig. 78 c.
- Leidy, Packard, 1882; 12th Rept. U. S. Geol. Survey Territories, p. 358,
fig. 24.
- Leidy, Jones, 1870; Geol. Mag., vol. 7, p. 219, pl. 9, fig. 11; also Geol.
Mag., Dec. 3, vol. 1, p. 361, pl. 12, fig. 13.
- tricarinata, Meek & Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 541,
figs. B₁, B₂, B₃. Coal Measures.
- tricarinata, White, 1884; 13th Ann. Rept. Dept. Geol. Nat. Hist. Indiana,
p. 167, pl. 39, figs. 10-13.

Leperditia, Rouault, 1851; Bull. Soc. Geol. France, 2d series, vol. 8, p. 377.

Gen. Char.—Carapace inequivalved; somewhat resembling a tamarind-
stone; valves smooth, convex, nearly oblong, longer than broad,
inequilateral, posterior half broadest; dorsal border straight; basal
margin nearly semicircular. Anterior and posterior sides oblique
above, rounded below. Valves united along their dorsal borders by a

simple linear hinge; the two extremities of the hinge-border form angles with the anterior and posterior borders of each valve. The right valve larger than the left, being broader and overlapping completely the ventral border of the opposite valve, and to some extent its anterior and posterior borders. This overlap forms a thick blunt keel to the closed carapace. Rather above and in front of the centre of each valve, and on its most convex portion there is a raised, circular, or sub oval swelling; on the interior surface of the valve this is marked by a corresponding pit. Type *L. Britannica*, Rouault.

Cytherina alta, Conrad, 1842; Geol. Rept. New York, 3d Geol. Dist. (Vanuxem), p. 112. Lower Helderberg.

Cytherina alta? Hall, 1852; Pal. New York, vol. 2, p. 338, pl. 78, figs. 2a-d; referred to *Leperditia Jonesi*, Hall; id., vol. 3, p. 372.

Leperditia alta, Jones, 1856; Annals & Mag. Nat. Hist., 2d series, London, vol. 17, p. 88, pl. 7, figs. 6, 7.

alta, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 250, pl. 10, figs. 10, 11.

alta, Hall, 1859; Pal. New York, vol. 3, p. 373, pl. 79a, figs. 6a-e.

alta, Meek, 1873; Pal. Ohio, vol. 1, p. 157, pl. 17, figs. 2a, b.

alta, Jones, 1881; Annals & Mag. Nat. Hist., 5th series, London, vol. 8, p. 346.

alta, Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 323, pl. 25, fig. 8-9.

alta, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London, vol. 14, p. 343.

amygdalina, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 341. Trenton.

amygdalina, Jones, 1858; Geol. Survey Canada, Dec. 3, p. 97, pl. 11, figs. 18, 19.

amygdalina, Jones, 1881; Annals & Mag. Nat. Hist., 5th series, London, vol. 8, p. 344, pl. 19, fig. 9.

amygdalina, Jones, 1884; id., 5th series, London, vol. 14, p. 342.

angulifera, Whitfield, 1881; Annals New York Acad. Sci., vol. 2, p. 199. Lower Helderberg.

Anna, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 347, pl. 9, fig. 18. Calciferous.

Anna, Jones, 1858; Geol. Survey Canada, Dec. 3, p. 96, pl. 11, fig. 13.

Anticostiana, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London, vol. 14, p. 241. Hudson River.

Canadensis, var. *Anticostiana*, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 341.

Canadensis, var. *Anticostiana*, Jones, 1858; Geol. Survey Canada, Dec. 3, p. 95, pl. 11, fig. 17.

Anticostiana, Billings, 1866; Catalogue Sil. Fossils Anticosti, p. 68.

fabulites (Conrad), var. *Anticostiana*, Jones, 1881; Annals & Mag. Nat. Hist., 5th series, London, vol. 8, p. 344, pl. 19, fig. 8.

arctica, Jones, 1856; Annals & Mag. Nat. Hist., 2d series, London, vol. 17, p. 87, pl. 7, figs. 1-5. Upper Silurian.

- Balthica*, var. *arctica* (Jones), Salter, 1852; Appendix Sutherland's Jour. Voyage Baffin's Bay, vol. 2, p. ccxxi, pl. 5, fig. 13.
- Balthica*, var. *arctica* (Jones), Salter, 1853; Quart. Jour. Geol. Soc. London, vol. 9, p. 314.
- argenta*, Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 146, pl. 8, fig. 5. Middle Cambrian.
- bivertex*, Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 11, pl. 7, figs. 5, 5 a. Hudson River.
- bivia*, White, 1874; Rept. Invert. Foss., U. S. Geog. & Geol. Survey W. 100th Mer., p. 11. Quebec.
- bivia*, White, 1877; U. S. Geog. & Geol. Survey W. 100th Mer., Palæont., vol. 4, p. 58, pl. 3, figs. 7 a-d.
- bivia*, Walcott, 1884; U. S. Geol. Survey Monographs, vol. 8, p. 88.
- Byrnesi*, Miller, 1874; Jour. Cincinnati Soc. Nat. Hist., vol. 1, p. 123, fig. 10. Hudson River.
- cæcigena*, Miller, 1881; Jour. Cincinnati Soc. Nat. Hist., vol. 4, p. 262, pl. 6, figs. 5, 5 a. Hudson River.
- Canadensis*, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 244, pl. 9, figs. 11-15; var. *nana* and *labrosa*. Chazy and Trenton.
- Canadensis*, Jones, 1858; Geol. Survey Canada, Dec. 8, p. 92; var. *nana*, pl. 11, figs. 6, 7, 9, 10; var. *labrosa*, pl. 11, fig. 8.
- Canadensis*, Jones, 1881; Annals & Mag. Nat. Hist., 5th series, London, vol. 8, p. 343, and p. 345, pl. 20, fig. 5.
- Canadensis*, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, vol. 14, p. 340.
- Canadensis*, var. *Fauquettiana*, Jones; see *L. Louckiana*.
- Compare *L. turgida*, *L. concinnula*, and *L. ventralis*.
- Cythere carbonaria*, Hall, 1856; Trans. Albany Inst., vol. 4, p. 33. Warsaw.
- carbonaria*, Whitfield, 1882; Bull. Am. Mus. Nat. Hist. N. Y., vol. 1, p. 94, pl. 9, figs. 24-27.
- carbonaria*, Hall, 1883; 12th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 375, pl. 32, figs. 24-27.
- capax*, Safford; Geol. Tennessee; not defined.
- Cayuga*, Hall, 1861; Description New Species Fossils, p. 83. Corniferous.
- Cayuga*, Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 111.
- concinnula*, Billings, 1865; Pal. Fossils, vol. 1, p. 299. Quebec.
- crepiformis*, Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 10, pl. 7, figs. 3, 3 a. Hudson River.
- (*Ischilina*) *cylindrica*, Hall, see *Ischilina cylindrica*.
- dermatoides*, Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 192, pl. 1, figs. 13, 13 a. Cambrian.
- faba*, Hall, 1876; 28th Rept. New York State Mus. Nat. Hist., Expl. pl. 32, figs. 1-3. Niagara.
- faba*, Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 186, pl. 32, figs. 1-3 (2d ed.).
- faba*, Hall, 1882; 11th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 331, pl. 34, figs. 1-3.

- Cytherina fabulites*, Conrad, 1843; Proc. Acad. Nat. Sci. Phila., vol. 1, p. 332.
Trenton.
- fabulites*, Jones, 1856; Annals & Mag. Nat. Hist., 2d series, London,
vol. 17, p. 89.
- fabulites*, Jones, 1858; id., 3d series, London, vol. 1, p. 341.
- fabulites*, Jones, 1881; id., 5th series, London, vol. 8, p. 342.
- fabulites*, Whitfield, 1883; Geol. Wisconsin, vol. 1, p. 60, fig. 5.
- fabulites*, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London,
vol. 14, p. 342.
- fonticola*, Hall, 1867; 20th Rept. N. Y. State Cab. Nat. Hist., p. 335,
pl. 21, figs. 1-3. Niagara.
- fonticola*, Hall, 1870; 20th Rept. N. Y. State Cab. Nat. Hist. (Rev. ed.),
p. 428, pl. 21, figs. 1-3.
- gibbera*, Jones, 1856; Annals and Mag. Nat. Hist., 2d series, London,
vol. 17, p. 90, pl. 7, figs. 1-3. Niagara.
- gibbera*, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1,
p. 250, pl. 10, figs. 7-9.
- gibbera*, var. *scalaris*, Jones, 1858; Geol. Survey Pennsylvania, vol. 2,
p. 834, fig. 698.
- gracilis*; see *Isochilina gracilis*.
- Hudsonica*, Hall, 1859; Pal. New York, vol. 3, p. 375, pl. 79 a, figs. 7 a, b, c.
Lower Helderberg.
- Jonesi*, Hall, 1859; Pal. New York, vol. 3, p. 372, pl. 79 a, figs. 5 a-e.
Lower Helderberg.
- Jonesi*, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London, vol. 14,
p. 343.
- alta*, Hall, 1852; Pal. New York, vol. 2, p. 338, pl. 78, figs. 2 a-d.
- Josephiana*, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London,
vol. 14, p. 341. Trenton.
- Canadensis*, var. *Josephiana*, Jones, 1858; Annals & Mag. Nat. Hist.,
3d series, London, vol. 1, p. 341.
- Canadensis*, var. *Josephiana*, Jones, 1858; Geol. Survey Canada, Dec. 3,
p. 94, pl. 11, fig. 16.
- fabulites*, var. *Josephiana*, Jones, 1881; Annals & Mag. Nat. Hist.,
5th series, London, vol. 8, p. 344, pl. 19, fig. 7; pl. 20, figs. 7, 8; also
p. 345, pl. 20, fig. 4?
- labrosa*, Jones; see *Leperditia Canadensis*.
- Louckiana*, Jones, 1884; Annals & Mag. Nat. Hist., 5th series, London,
vol. 14, p. 341. Trenton.
- Canadensis?* Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London,
vol. 1, p. 245, pl. 9, figs. 16, 17; afterwards var. *Louckiana* & var.
Pauquettiana.
- Canadensis*, var. *Louckiana*, Jones, 1858; Geol. Survey Canada, Dec. 3,
p. 93, pl. 11, fig. 11.
- fabulites*, var. *Louckiana*, Jones, 1881; Annals & Mag. Nat. Hist., 5th series,
London, vol. 8, p. 343.

- Cypridina marginata*, Keyserling, 1846; Wiss. Beob. auf einer Reise in das Petschora-Land, p. 288, pl. 11, fig. 16.
marginata, Jones, 1858; Annals & Mag. Nat. Hist., 2d series, London, vol. 17, p. 91, pl. 7, figs. 11-15.
- Cypridina Balthica*, Eichwald (not *Cytherina Balthica*, Hisinger); Bull. Soc. Nat. Moscow, 1854, No. 1, p. 99, pl. 2, fig. 6.
(Isochilina) minutissima, Hall; see *Isochilina minutissima*.
Morgani, Safford, Geol. Tennessee; not defined.
nana, Jones; see *Leperditia Canadensis* var. *nana*.
Okeni (Münster), Dawson, 1868; Acadian Geology, p. 256, fig. 78 b.
Lower Carboniferous.
- Ottawa*; see *Isochilina Ottawa*.
ovata, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 252, pl. 10, fig. 14. Trenton.
ovata, Jones, 1858; Geol. Survey Pennsylvania, vol. 2, p. 834, fig. 697.
Pauquettiana; see *Leperditia Canadensis* var. *Pauquettiana*.
parasitica, Hall, 1859; Pal. New York, vol. 3, p. 376, pl. 79 a, figs. 8 a, b. Lower Helderberg.
parvula, Hall, 1859; Pal. New York, vol. 3, p. 376, pl. 79 a, figs. 9 a, b. Lower Helderberg.
Pennsylvanica, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 251; pl. 10, figs. 12, 13. Clinton.
Pennsylvanica, Jones, 1858; Geol. Survey Pennsylvania, vol. 2, p. 834, figs. 699.
punctulifera, Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 92. Hamilton.
radiata, Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 9, pl. 7, figs. 2 a, b. Utica.
rotundata, Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, No. 8, p. 206, pl. 16, fig. 5. Devonian.
scalaris, *L. gibbera* var. *scalaris*, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, vol. 1, p. 250, pl. 10, figs. 7, 8, 9. Waterlime.
Seneca, Hall, 1861; Desc. New Species Fossils, p. 84. Hamilton.
Seneca, Hall; 15th Rept. New York State Cab. Nat. Hist., p. 112.
sinuata, Hall, 1860; Canadian Naturalist, vol. 5, p. 158.
sinuata, Dawson, 1868; Acadian Geology, p. 609. Upper Silurian.
spinulifera, Hall, 1861; Desc. New Species Fossils, p. 83. Corniferous.
spinulifera, Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 111.
Cythere sub-lævis, Shumard, 1855; First and Second Ann. Rept. Geol. Missouri, p. 195, pl. B, fig. 15. Lower Magnesian.
- Troyensis*, Ford; see *Aristozoe Troyensis*.
unicornis, Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 10, pl. 7, figs. 4, 4 a, b. Hudson River.
ventralis, Billings, 1865; Pal. Fossils, vol. 1, p. 300. Quebec.(?)
- Lepidocolena**, Faber, 1886; Jour. Cincinnati Soc. Nat. Hist., vol. 9, p. 15.
Jamesi (Hall & Whitfield), Faber, 1886; id., vol. 9, p. 15, pl. 1, figs. A to F. Hudson River.

Lisagocaris, Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 478.

Lutheri, Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 478, pl. 1,
fig. 5. Hamilton.

Mesothyra, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 187.

Diagnosis.—Carapace sub-quadrate in outline, composed of two valves which come into contact at the apices of two broad, sub-triangular extensions, situated on the dorsal line opposite the eye-nodes, forming a short and broad anterior, or rostral cleft, and a long posterior cleft. Rostrum not observed. The posterior dorsal cleft was covered either by a single elongate plate, with each margin of which the valves were in symphysis, or, as is more probable, by a double plate, divided by a median suture. Test broadly infolded on the lower surface, thickened and produced into a conspicuous and acute posterior spine. Posterior margin incurved and produced into a short spine at the dorsal line. Surface with a single strong carina on each valve. Abdomen consisting of two somites of which the posterior is the longer. Post-abdomen with a broad caudal plate, which is produced into a relatively short telson. Lateral spines long and setaceous.

Neptuni, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 191, pl. 32,
fig. 7; pl. 33, fig. 1. Hamilton.

Dithyrocaris Neptuni, Hall, 1876; Ill. Devonian Fossils, pl. 23, fig. 6, *not*
pl. 22, figs. 1-5; pl. 23, figs. 1-3.

Dithyrocaris Neptuni, Packard; 12th Rept. U. S. Geol. Survey Territories,
p. 452, fig. 73.

Dithyrocaris Neptuni, Etheridge, Woodward & Jones, 1887; 5th Rept.
Comm. Fossil Phyllopoda Pal. Rocks, p. 8.

Neptuni, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Fossil
Phyllopoda, p. 8.

Oceani, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 187, pl. 32,
figs. 1-6; pl. 33, figs. 4-7; pl. 34, figs. 1-5. Portage.

Dithyrocaris Neptuni, Hall, 1876; Illust. Devonian Fossils, pl. 22, figs. 1-5,
pl. 23, figs. 1-3.

Dithyrocaris Neptuni, Etheridge, Woodward & Jones, 1887; 5th Rept. Comm.
Fossil Phyllopoda Pal. Rocks, p. 8.

Oceani, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Fossil
Phyllopoda Pal. Rocks, p. 8.

stunæa, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 193, pl. 32,
figs. 8, 9; pl. 34, fig. 2. Hamilton.

stunæa, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm. Fossil
Phyllopoda Pal. Rocks, p. 8.

(*Dithyrocaris*?) Veneris, Hall & Clarke, 1888; Pal. New York, vol. 7,
p. 193, pl. 33, fig. 3. Hamilton.

(*Dithyrocaris*?) Veneris, Etheridge, Woodward & Jones, 1888; 6th Rept.
Comm. Fossil Phyllopoda Pal. Rocks, p. 8.

Neolimulus, Woodward, 1868; Geol. Mag., vol. 5, p. 1. Type *Neolimulus*
fulcatus, Woodward.

Nothozoe, Barrande, 1872; Syst. Sil. Bohême, vol. 1, Suppl., p. 536. Type *Nothozoe pollens*, Barrande.

Vermontana, Whitfield, 1884; Bull. Am. Mus. Nat. Hist., vol. 1, p. 144, pl. 14, figs. 14, 15. Potsdam.

Palæocaris, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 48.

Gen. Char.—"Inner and outer pair of antennæ of nearly equal length, the former each bearing a well-developed accessory appendage; peduncles of both pair shorter than the flagella. Head about as long as the first two abdominal segments. Thoracic legs long and slender; anterior pair not chelate. Telson long, tapering, and horizontally flattened; stylets with first joint very small, second double, and also flattened horizontally." (Meek & Worthen, Geol. Illinois, vol. 2, p. 403.)

Acanthotelson inæqualis, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 48. Coal Measures.

Acanthotelson inæqualis, Meek & Worthen, 1866; Geol. Illinois, vol. 2, p. 403, pl. 32, figs. 7, 7 a. Referred to *Palæocaris typus*.

Palæocaris typus, Meek & Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 49.

inæqualis, Meek & Worthen, 1866; Geol. Illinois, vol. 2, p. 403, pl. 32, figs. 7, 7 a. *Palæocaris typus*, p. 405, pl. 32, figs. 5 a, b, c, d.

typus, Meek & Worthen, 1868; Geol. Illinois, vol. 3, p. 552, figs. a, b.

typus, Peach, 1880; Trans. Royal Soc. Edinburgh, vol. 30, p. 85, pl. 10, figs. 10 g, 10 h.

typus, Brocchi, 1880; Bull. Soc. Geol. France, vol. 8, p. 9, pl. 1, figs. 8-10.

typus, Woodward, 1881; Geol. Mag., Dec. 2, vol. 8, p. 533, woodcut.

typus, White, 1884; 13th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 179, pl. 38, figs. 1, 2, 3.

typus, Packard, 1885, Am. Naturalist, vol. 19, p. 790.

typus, Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 129, pl. 3, figs. 1-4; pl. 7, figs. 1, 2.

Palæocrangon, Salter, 1861; see *Crangopsis*, Salter, 1863.

Palæopalaemon, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 40.

Diagnosis.—"Cephalothorax not rostrate? Keeled upon the dorsum and sides. Antennules not observed. Antennæ with very strong basal joints, exceeding in strength any of the thoracic appendages. Eye peduncles probably short. Thoracic ambulatory appendages slender, not forcipate. Abdomen composed of 6 segments. Telson short, rapidly tapering, and connected by a membranous expansion with the lateral caudal spines. In the midst of this caudal expansion lies a pair of thin lamellar spines articulated at their proximal extremities to both telson and lateral spines." (Hall & Clarke, Pal. New York, vol. 7, p. lxi.)

Newberryi, Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 41.

Erie Shales.

(Plate, figs. 1, 2, 3. Plate and explanation only with author's edition.)

Newberryi, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 203, pl. 30, figs. 20-23.

Palæocreusia, Clarke, 1888; Pal. New York, vol. 7, p. 210.

Devonica, Clarke, 1888; Pal. New York, vol. 7, p. 210, pl. 36, figs. 24, 26.
Corniferous.

Prestwichia, Woodward, 1867; Quart. Jour. Geol. Soc. London, vol. 23, p. 32.

A generic name proposed for the so-called fossil *Limuli*, in which the thoracic and abdominal segments are not divided, and in which the former appear to be anchylosed. Type *Prestwichia anthrax* (Prestwich), Woodward.

Danæ (Meek & Worthen), Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 146, pl. 5, figs. 3, 3a; pl. 6, figs. 1a, 2, 2a.

For other references to this species see *Euproöps* and *Belinurus*.

Eriensis, Williams, 1885; Am. Jour. Sci., 3d series, vol. 30, p. 46, 3 figures.
(See *Protolimulus Eriensis*.) Devonian.

Protolimulus, Packard, 1866; Mem. Natl. Acad. Sci., vol. 3, p. 150.

Diagnosis.—Cephalothorax relatively large sub-semicircular, genal angles produced. Cephalic appendages small; terminal segments of the posterior members foliaceous. Abdomen composed of 6 (?) segments, including the large caudal spine. (Hall & Clarke, 1888; Pal. New York, vol. 7, p. xlviii.)

Eriensis (Williams), Packard, 1886; Mem. Natl. Acad. Sci., vol. 3, p. 150, figs. 11–13.

Eriensis, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 153, pl. 26, figs. 1, 2.

Primitia, Jones & Holl, 1865; Annals & Mag. Nat. Hist., 3d series, London, vol. 16, p. 415.

Gen. Char.—Carapace minute, bivalved, either equivalved or nearly so, convex, more or less oblong, often approaching Leperditia in shape, by the sloping of the dorsal angles; hinge-line straight, sometimes nearly as long as the valve. Surface of each valve usually impressed on the dorsal region, either medially or towards the anterior extremity, with a vertical sulcus, variable in size, sometimes barely visible, sometimes passing into, or even merely represented by, a navel-like pit; and sometimes the sides of the sulcus are swollen and even raised up into tubercles.

cristata, Whitfield, 1889; Bull. Am. Mus. Nat. Hist. New York, vol. 2, p. 59, pl. 13, figs. 1, 2. Calciferous.

gregaria, Whitfield, 1889; Bull. Am. Mus. Nat. Hist. New York, vol. 2, p. 58, pl. 13, figs. 3–5. Calciferous.

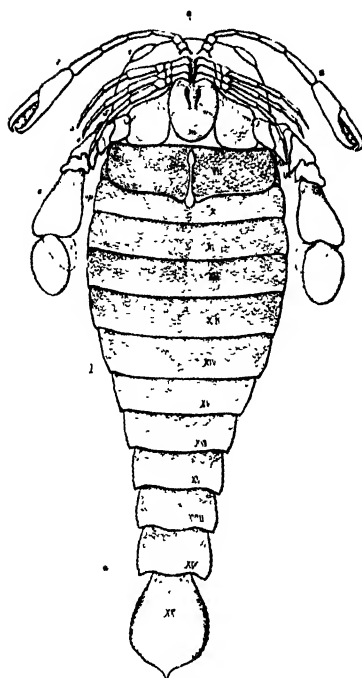
Beyrichia Logani, var. *leperditoides*, Jones, 1858; Annals & Mag. Nat. Hist., 3d series, London, vol. 1, p. 244, pl. 9, fig. 10. Trenton.

Beyrichia Logani, var. *leperditoides*, Jones, 1858; Geol. Survey Canada, Dec. 3, p. 91, pl. 11, figs. 1–5.

leperditoides, Jones, 1884; Annals & Mag. Nat. Hist., 6th series, London, vol. 14, p. 345.

Beyrichia (*Primitia*) *occidentalis*, Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, No. 8, p. 204, pl. 17, figs. 4, 4a. Devonian.

- Seelyi, Whitfield, 1889; Bull. Am. Mus. Nat. Hist. New York, vol. 2, p. 60,
pl. 13, figs. 15-21. Calciferous.
- Protobalanus**, Whitfield, 1888; Pal. New York, vol. 7, p. 209; Bull. Am.
Mus. Nat. Hist. New York, vol. 2, 1889, p. 66.
- Diagnosis*.—Shell ovate about the base; composed of 12 plates of which
the carina is largest and most elevated. Rostrum small; lateralia
five on each side; radial areas between the lateralia broad; scutum
and tergum not known. General surface depressed convex. (Hall and
Clarke, 1888; Pal. New York, vol. 7, p. lxii.)
- Hamiltonensis (Whitfield), Hall & Clarke, 1888; Pal. New York, vol. 7,
p. 209, pl. 36, fig. 23. Hamilton.
- Hamiltonensis, Whitfield, 1889; Bull. Am. Mus. Nat. Hist. New York,
vol. 2, p. 67, pl. 13, fig. 22. Marcellus Shales.
- Protocharis**, Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 50.
- Diagnosis*.—"Carapace without evidence of a dorsal suture, rounded on
the dorsal line, and bent downward on the sides; without any rostrum.
Body many-jointed, 31 segments extending out from beneath the cara-
pace; the last segment broader than the preceding and terminating in
two spines." (Bull. U. S. Geol. Survey, No. 30, p. 147.)
- Marshi, Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 50, pl. 10.
Middle Cambrian.
- Marshi, Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 148, pl. 15,
fig. 1.
- Pterygotus**, Agassiz, 1844; Mon. Poissons Fossiles, etc., note, p. xix.
See figure on next page.
- acuticaudatus, Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 24,
pl. 2, fig. 3. Waterlime.
- Cobbi, Hall, 1859; Pal. New York, vol. 3, p. 417*, pl. 83 b, fig. 4, pl. 84,
fig. 8? Waterlime.
- bilobus (Huxley & Salter), Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci.,
vol. 5, p. 27. Waterlime.
- Buffaloensis, Pohlman, 1881; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 17,
figs. 1, 2. Waterlime.
- Buffaloensis, Pohlman, 1882; id., vol. 4, p. 44, pl. 3, fig. 3.
- Buffaloensis, Pohlman, 1886; id., vol. 5, p. 24, pl. 3, fig. 1.
- Cummingsi, Grote & Pitt, 1875; Bull. Buffalo Soc. Nat. Sci., vol. 3, p. 18,
figure. Waterlime.
- Cummingsi, Grote & Pitt, 1878; Proc. Am. Assoc. Adv. Sci., 26th Meet-
ing, p. 300, figure.
- globicaudatus, Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 42,
pl. 2, fig. 2. Waterlime.
- macrophthalmus, Hall, 1859; Pal. New York, vol. 3, p. 418*, pl. 80 a,
figs. 8, 8 a. Waterlime.
- macrophthalmus, Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 44.
- Osborni, Hall, 1859; Pal. New York, vol. 3, p. 419*, pl. 80 a, fig. 9.
Waterlime.
- quadraticaudatus, Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4,
p. 43, pl. 3, fig. 1. Waterlime.



THE UNDER SIDE OF *PTERYGOTUS ANGLICUS*, AGASSIZ, RESTORED.

1. Eyes.
2. Chelate antennæ.
3. Mandibles [Endognaths, Huxley].
4. First maxillæ [Endognaths, Huxley].
5. Second maxillæ [Endognaths, Huxley].
6. Maxillipeds [Ectognaths, Huxley].
- i, i, Position of small, somewhat triangular, plate united to the border of the penultimate joint, and overlapping the oval terminal palette.
- vi, The head-shield, bearing the ocelli [i] and large compound eyes [ii], and the operculum, or thoracic plate, which covers the two anterior thoracic somites [viii and ix] upon their ventral surfaces.
- viii-xiv, Thoracic somites.
- xv-xix, Abdominal somites.
- xx, "Telson" or terminal segment.
- xxi, Metastoma or post-oral plate.
- xx, Operculum [representing the coalesced pair of appendages belonging to the viiith somite].

Note.—The figure and nomenclature are copied from Dr. Henry Woodward's excellent Monograph of the British Fossil Crustacea belonging to the order Merostomata, plate viii.

Plumulites, Barrande, 1872; Syst. Sil. Bohême, Suppl., vol. 1, p. 565.

Devonicus, Clarke, 1882; Am. Journ. Sci., 3d series, vol. 24, p. 55,
figs. 1, 2. Hamilton.

Jamesi, Hall & Whitfield, 1875; Pal. Ohio, vol. 2, p. 106, pl. 4, figs. 1-3.
Hudson River.

? Jamesi, Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 275, fig. 19.

Referred by Faber, Jour. Cincinnati Soc. Nat. Hist., vol. 9, 1886, p. 15,
to a new genus under the name of *Lepidocoleus*.

Newberryi, Whitfield, 1881; Annals New York Acad. Sci., vol. 2, p. 217.
Huron Shales.

Rhachura, Scudder, 1878; Proc. Boston Soc. Nat. Hist., vol. 19, p. 296.

Probably the same as the genus *Dithyrocaris*, Scouler, 1843.

venosa, Scudder, 1878; Proc. Boston Soc. Nat. Hist., vol. 19, p. 296, pl. 9,
figs. 3, 3a. Coal Measures.

Dithyrocaris? venosa, Etheridge, Woodward & Jones, 1889; 6th Rept. Comm.

Fossil Phyllopoda, p. 4. 57th Rept. Brit. Assoc. Adv. Sci., p. 60.

Rhinocaris, Clarke, 1888; Pal. New York, vol. 7, p. lviii.

Diagnosis.—"Cephalo-thorax univalvular, laterally appressed; outline as in *Ceratiocaris*. Anterior extremity produced into a narrow, vertically flattened *prora* continuous with substance of the carapace. The axial line of the carapace bears a low ridge along which it shows no inclination to separate when laterally compressed. Surface smooth or with one or more lateral carinæ, and ornamented by finely elevated lines, granules, or tubercles. Abdomen composed of not less than 4 smooth sub-cylindrical somites. Post-abdomen bearing three spines, of which the telson is elongated and conical and the cercopods flattened." (Pal. New York, vol. 7, p. lviii.)

Columbina, Clarke, 1888; Pal. New York, vol. 7,
p. 195, pl. 31, figs. 16-21. Hamilton.

Columbina, Etheridge, Woodward & Jones, 1888; 6th
Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 8.

scaphoptera, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 197, pl. 31,
figs. 22, 23. Hamilton.

scaphoptera, Etheridge, Woodward & Jones, 1888; 6th Rept. Comm.
Fossil Phyllopoda Pal. Rocks, p. 8.

Schizodiscus, Clarke, 1888; Pal. New York, vol. 7, p. 207.

capra, Clarke, 1888; Pal. New York, vol. 7, p. 207, pl. 35, figs. 1-9.

Hamilton.

Spathiocaris, Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 477.

Diagnosis.—"Carapace in one piece, elliptical, subconical and patelloid apex situated at or near one focus of the ellipse. The cephalic cleft begins just in front of the apex and slowly widens to the anterior extremity. Surface ornamented with closely set concentric lines, and usually with fine radii on the anterior and posterior portions." (Pal. New York, vol. 7, p. lviii.)



Emersoni, Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 478, plate (4), figs. 1-3. Hamilton.

Emersoni, Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451.

Emersoni, Woodward & Jones, 1884; 2d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 7.

Emersoni, Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 46.

Emersoni, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 3.

Emersoni, Clarke, 1886; Neues Jahrbuch für Min., p. 180.

Emersoni, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 199, pl. 35. figs. 12-18.

Emersoni, Etheridge, Woodward & Jones; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, pp. 3 and 8.

Solenocaris, Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335. (Not *Solenocaris*, Young, 1868.)

The term *Solenocaris* was used by Mr. J. Young for a fossil genus of Crustacea in 1868; see *Strigocaris*.

St. Ludovici, Worthen, 1884; Bull. Illinois State Cab. Nat. Hist., No. 2, p. 3. St. Louis.

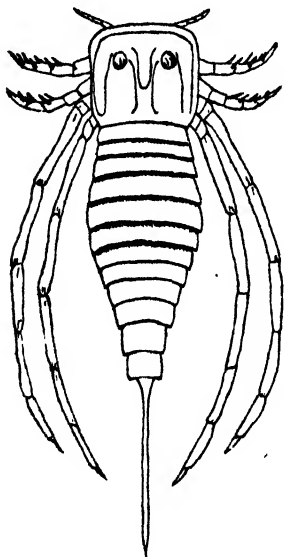
Ceratiocaris (*Solenocaris*) *strigata*, Meek, 1871; Proc. Acad. Nat. Sci. Phila., 3d series, p. 335. Waverly.

Ceratiocaris (*Solenocaris*) *strigata*, Meek, 1875; Pal. Ohio, vol. 2, p. 321, pl. 18, figs. 4 a, b, c.

Strigocaris, name suggested to replace pre-occupied name *Solenocaris*.

Strobilepsis, Clarke, 1888; Pal. New York, vol. 7, p. 212.

spinigera, Clarke, 1888; Pal. New York, vol. 7, p. 212, pl. 36, figs. 20-22. Hamilton.



Stylonurus, Page, 1856; Advanced Text Book Geology.

Diagnosis. — Body in general proportions similar to *Eurypterus*. Cephalon subquadrate or sub-pentagonal in outline. Eyes large, circular, and approximate; sometimes surrounded by conspicuous orbital ridges. Ocelli situated at the posterior extremity of a median ridge, passing between the eyes. Surface coarsely squamose. Cephalic appendages in 5 pairs, the last of which are produced nearly to the extremity of the telson. Segments of the abdomen similar to those of *Eurypterus*. Those of the post-abdomen each bear a pair of lateral, detachable processes or *epimera*. Caudal spine long and slender or subclavate.

excelsior, Hall, MSS.

excelsior, Martin, 1882; Trans. New York Acad. Sci., vol. 2, p. 8.

Catskill.

excelsior, Hall, 1884; 36th Rept. New York State Mus., p. 77, pl. 5, fig. 1.

excelsior, Hall, 1885; Proc. Am. Assoc. Adv. Sci., 33d meeting, p. 421.

excelsior, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 158, pl. 26: also p. 221, pls. 26, and 26 a.

Compare *Dolichocephala Lacoana*, Claypole, 1883.

Stylonurus Wrightianus, Dawson.

Equisetides Wrightianus, Dawson, 1881; Quart. Jour. Geol. Soc. London, vol. 37, p. 301, pl. 12, fig. 10; pl. 13, fig. 20. Portage.

Equisetides Wrightianus (Dawson), Wright; 35th Rept. New York State Mus. Nat. Hist., Expl. pl. 15, note, figs. 1, 2, 3.

Echinocaris Wrightiana, Jones & Woodward, 1884; Geol. Mag., Dec. 3, vol. 1, p. 3, pl. 13, figs. 1 a, b.

Echinocaris Wrightiana, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35; also 6th Rept. 1888, p. 8. ? (*Echinocaris*?) *Wrightianus*, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 160, pl. 27, figs. 7-9.

Tropidocaris, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 15.

Diagnosis.—"Carapace bivalvular, sub-quadrate or sub-ovate in outline, posterior margin transverse or incurved. Hinge-line straight, nearly equaling the length of the valves. Valves slightly gaping at the anterior extremity. Rostrum narrow and elongate, ornamented with longitudinal ridges. Cephalic region characterized by low, rounded, indistinct elevations. Optic node well defined. Surface with one or more strong longitudinal carinae. Abdomen as far as known, composed of two segments, which are subcylindrical and without nodes or spines." (Hall & Clarke, Pal. New York, vol. 7, p. lvi.)

alternata, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 19, pl. 2, figs. 7, 8. Chemung.

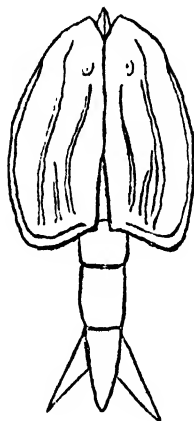
alternata, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.

alternata, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 186, pl. 31, figs. 14, 15.

bicarinata, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 16, pl. 2, figs. 3-5. Chemung.

bicarinata, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.

bicarinata, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 184, pl. 31, figs. 7-12.



interrupta, Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP,
p. 18, pl. 2, fig. 6. Chemung.

interrupta, Etheridge, Woodward & Jones, 1885; 3d Rept. Comm. Fossil
Phyllopoda Pal. Rocks, p. 35.

interrupta, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 185, pl. 31,
fig. 13.

Turrilepas, Woodward, 1865; Quart. Jour. Geol. Soc. London, vol. 21, p. 489.

Diagnosis.—Elongate cone-shaped bodies, composed of from 4 to 6 vertical
ranges of scale-like plates, which are subtriangular in general outline,
and are covered with strong, somewhat elevated concentric lines. The
plates of the middle range are distinguished from those of the lateral
range by their more convex surface and median carina.

cancellatus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 216, pl. 36,
fig. 2. Corniferous.

Devonicus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 216, pl. 36,
fig. 3. Hamilton.

flexuosus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 215, pl. 36,
fig. 1. Corniferous.

foliatus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 218, pl. 36, fig. 15.
Hamilton.

? Newberryi, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 219, pl. 36,
figs. 16-19. Hamilton.

nitidulus, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 218, pl. 36, fig. 4.
Hamilton.

squama, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 217, pl. 36,
figs. 5-8. Hamilton.

tener, Hall & Clarke, 1888; Pal. New York, vol. 7, p. 219, pl. 36,
figs. 9-14. Hamilton.

ADDENDA.

Aparochites, Jones.

minutissimus [Hall] Ulrich, 1889; Contributions Micro-Palæont., part 2, p. 49. Trenton and Hudson River.

For other references see *Leperditia* [*Isochilina*] *minutissima*, Hall.

unicornis, Ulrich, 1889; id., p. 50, plate 9, fig. 11. Hudson River.

For other references see *Leperditia unicornis*, Ulrich.

Bythocypris, Jones.

cylindrica [Hall] Ulrich, 1889; id., p. 48, plate 9, fig. 6.

Trenton and Hudson River.

For other references see *Leperditia* [*Isochilina*] *cylindrica*, Hall.

Eurychilinda, Ulrich.

Valves semicircular, suboval, or even nearly circular. Dorsal line straight, generally with a well-defined sub-central sulcus and a more or less prominent node just behind it. A very broad convex border extends around the valves from the antero-dorsal to the postero-dorsal angle. The border is often striated in a radial manner, and in most cases terminated by a marginal "frill," or by a plain narrow border, usually directed slightly outwards. The main body of the border, however, curves inward to near the plane of contact between the two valves, thus forming a deeply concave outer area. Hingement simple. Surface reticulate, granulose or smooth.

reticulata, Ulrich, 1889; Contributions Micro-Palæont., part 2, p. 52, plate 9, figs. 9 and 9 a. Trenton.

Manitobensis, Ulrich, 1889; id., p. 53, plate 9, figs. 10 and 10 a.

Hudson River.

striato-marginata [Miller] Ulrich, 1889; id., p. 52.

For other references see *Beyrichia striato-marginata*, Miller.

Leperditia subcylindrica, Ulrich, 1889; id., p. 49, plate 9, figs. 4-4 b.

Trenton and Hudson River.

Primitia lativia, Ulrich, 1889; id., p. 50, plate 9, figs. 8, 8 a. Hudson River.

[?] *Beyrichia*] *parallela*, Ulrich, 1889; id., p. 51, plate 9, figs. 7-7 a.

Hudson River.

Strepula, Jones & Holl.

lunatifera, Ulrich, 1889; id., p. 56, plate 9, figs. 14-14 b. Hudson River.

quadrilirata [Hall & Whitfield] Ulrich, 1889; id., p. 54, plate 9, fig. 12.

For other references see *Beyrichia quadrilirata*, Hall & Whitfield.

quadrilirata, var. simplex, Ulrich, 1889; id., p. 55, pl. 9, fig. 13.

Prof. Ulrich's article has appeared while this paper was going through the press; as therefore it was impossible to embody these references in the main text, they are added here.

EXPLANATION OF PLATE I.

ILLUSTRATIVE OF THE STRUCTURE OF THE XIPIHOSURA AND EURYPTERIDA.

- Fig. 1. *Belinurus reginæ*, Bailey ; Coal Measures, Ireland.
H., Head. Th., Thorax. Ab., Abdomen. T., Telson.
- Fig. 2. *Prestwichia rotundata*, Prestwich ; Coal Measures, Coalbrook Dale, Eng.
- Fig. 3. *Hemiaspis limuloides*, H. Woodward ; Lower Ludlow shales.
- Fig. 4. *Bunodes limula*, Eichw. ; Upper Silurian, Isle of Oesel, Baltic.
- Fig. 5. *Pseudoniscus aculeatus*, Nieszk. ; Upper Silurian, Isle of Oesel, Baltic.
- Fig. 6. *Exapinurus Schrenkii*, Nieszk. ; Upper Silurian, Isle of Oesel, Baltic.
- Fig. 7. *Eurypterus remipes*, De Kay ; Upper Silurian, New York.

Note.—The figures given on this plate are copied after those of Dr. Henry Woodward, Proc. Geol. Soc. London, vol. 23, 1867, plate 1.

EXPLANATION OF PLATE II.

ILLUSTRATIVE OF THE STRUCTURE OF THE OSTRACODOUS AND PHYLLOPODOUS GENERA.

[The small horizontal lines indicate the length of the valves when magnified two diameters, for comparison with figs. 17 a, b, c.]

- Fig. 1. *Bairdia curta*, McCoy. Carboniferous. 1 a, Left valve. 1 b, Ventral edge of the same valve. Magnified 15 diam.
- Fig. 2. *Thlipsura corpulenta*, Jones & Holl. Woolhope beds, Upper Silurian. 2 a, Right valve. 2 b, Ventral aspect. 2 c, Posterior extremity. Magnified 15 diam.
- Fig. 3. *Cythere Jukesiana*, Jones & Holl. Kildare limestone, Lower Silurian. 3 a, Right valve. 3 b, Ventral view. Magnified 15 diam.
- Fig. 4. *Cytherella brevis*, Jones. Carboniferous, Carlisle, Scotland. Magnified 15 diam.
- Fig. 5. *Cytherellina siliqua*, Jones. Upper Silurian. 5 a, Internal cast, with part of the shell, showing level outside and undulated interior. 5 b, Right valve. 5 d, End view. Magnified 15 diam.
- Fig. 6. *Æchmina cuspidata*, Jones & Holl. Wenlock limestone ; Upper Silurian. Right valve. Magnified 15 diam.
- Fig. 7. *Carbonia Agnes*, Jones. Coal Measures, South Wales. 7 a, Left valve. 7 b, The internal cast of the muscle-spot and its neighborhood, in

the variety *rugulosa*. Magnified 70 diam. 7c, The external aspect of the muscle-spot in *C. Agnes*. Magnified 70 diam.

- Fig. 8. Cypridina Phillipsiana, Jones. Carboniferous, Ireland. 8a, Right valve. 8b, Ventral edge. Magnified 3 diam.
- Fig. 9. Cypridella Koninckiana, Jones. Carboniferous, Ireland. 9a, Right valve. 9b, Ventral edge. Magnified 3 diam.
- Fig. 10. Cyprella subannulata, Jones. Carboniferous, Ireland. 10a, Right valve. 10b, Ventral edge. Magnified 3 diam.
- Fig. 11. Entomoconchus Scouleri, McCoy. Carboniferous, Yorkshire. Right valve. Magnified 3 diam.
- Fig. 12. Entomis divisa, Jones. Upper Silurian, from near Builth, South Wales. The two valves exposed. Magnified 3 diam.
- Fig. 13. Entomis biconcentrica, Jones. Carboniferous, Ireland. 13a, Left valve. 13b, Ventral edge. Magnified 3 diam.
- Fig. 14. Primitia renulina, Jones & Holl. Wenlock limestone. 14a, Right valve. 14b, Dorsal view. Magnified 15 diam.
- Fig. 15. Kirkbya Urei, Jones. Carboniferous, Scotland. 15a, Side view. 15b, Ventral view. Magnified 5 diam.
- Fig. 16. Moorea silurica, Jones & Holl. Upper Ludlow, Malvern. 16a, Left valve. 16b, Ventral edge. Magnified 15 diam.
- Fig. 17. Leperditia Balthica, Hisinger. Upper Silurian, Gothland. 17a, Perfect carapace, left valve seen. 17b, Dorsal view. 17c, Front end. Magnified 2 diam.
- Fig. 18. Isochilina gracilis, Jones. Lower Silurian of Isle Jesus, Canada. 18a, Right valve. 18b, Ventral edge. 18c, End view. Magnified 5 diam.
- Fig. 19. Beyrichia Wilckeniana, Jones. Upper Silurian of Gothland. Right valve. Magnified 5 diam.
- Fig. 20. Beyrichia Kloedeni, McCoy. Upper Silurian, Shropshire. Right valve. Magnified 5 diam.
- Fig. 21. Beyrichia complicata, Salter. Caradoc and Bala Works, Wales. Right valve. Magnified 5 diam.
- Fig. 22. Leaia Leidyi, Lea. Coal Measures, South Wales. Right valve. Magnified 5 diam.
- Fig. 23. Estheria membranacea, Pacht. Devonian, Livonia. Left valve. Magnified 5 diam.
- Fig. 24. Estheria tenella, Jordan. Carboniferous, Lanarkshire. Right valve. Magnified 5 diam.

Note.—The figures given on this plate are copied after those of Professor T. Rupert Jones's article "On Ancient Water-fleas of the Ostracodous and Phyllopodous Tribes [Bivalved Entomostraca.]" (Monthly Microscopical Jour., October, 1870, p 184, plate lxi.)

II.—*Coleopterological Notices.*

I.

BY THOMAS L. CASEY.

Read October 7, 1889.

The following pages embody the results of a number of detached studies in various parts of the Coleopterous series, and are confined, in general, to the fauna of America north of Mexico. The family Phalacridæ, and the genera *Thinobius*, *Aploderus*, and *Limnichus* are treated monographically.

I have to acknowledge my appreciation of the kindness shown me by the authorities of the Museum of Comparative Zoology, at Cambridge, Mass., under the curatorship of Dr. H. A. Hagen, for permission to examine the types of Dr. LeConte, without which no systematic work of scientific value could have been accomplished.

I am also indebted to Prof. C. V. Riley for the use of the material of the National Museum, which has been of great service in determining geographical distribution in the Phalacridæ, and to Dr. D. Sharp, and Messrs. E. A. Schwarz, Otto Lugger, and H. F. Wickham, for valuable specimens.

NEW YORK, September 29, 1889.

NOTE.

The introduction of new names for parts of an insect, when names already in use will serve just as well, should be avoided, and, as the term *hypomera* has been employed by me in many descriptions for the inflexed sides of either the pronotum or elytra, by prefixing the proper adjective, it may be objected that *epipleuræ* would serve the same purpose, and that the new word is therefore unnecessary. I have consequently determined to restrict the meaning of *hypomera*, so as to denote simply the inflexed sides of the pronotum, reserving the word *epipleuræ* to denote the inflexed sides of the elytra, and the word *hypo-*

pleuræ to designate the lower beaded margin of the epipleuræ, which, although generally small and sometimes obsolete, occasionally becomes larger and rather conspicuously modified. It is hoped that this will tend to promote conciseness, and that the consequent reduction of words will warrant the proposed nomenclature.

CARABIDÆ.

PSEUDOMORPHA Kirby.

By referring to the table of species published by Dr. Horn (Trans. Am. Ent. Soc., X, p. 273), it will be seen that the following form is not closely allied to any hitherto known. It is extremely slender, parallel and convex, and is distinguished by the nine series of elytral punctures being very distinctly traceable.

P. cylindrica n. sp.—Parallel, very convex, rather more than three times as long as wide, uniformly blackish-piceous above; under surface and legs bright rufous; integuments highly polished; margins fluminate. *Head* short and broad, feebly convex, nearly four-fifths as wide as the prothorax, very finely, sparsely and unevenly punctate, the punctures in the form of minute strongly embossed rings; eyes large, finely faceted; antennæ slender, compressed, cylindrical; joints four to eleven very compactly joined, second three-fifths as long as the third, the latter longer than the fourth, five to ten subequal, nearly as long as the third, the eleventh longer. *Prothorax* scarcely more than one-third wider than long; sides very feebly convergent from base to apex and just visibly arcuate; basal angles—viewed laterally—broadly rounded, apical narrowly rounded; base and apex transversely truncate, the former with a fringe of short pointed closely placed setæ; disk transversely, very strongly convex, very narrowly explanate along the sides, margined at the sides and apex with a wide elevated bead which is completely obsolete throughout the basal margin, very minutely, sparsely punctate; punctures rather unevenly distributed, annulate; median impressed line completely obsolete. Scutellum very minute, transversely triangular. *Elytra* fully as wide as the base of the prothorax, twice as long as wide, three and two-thirds times as long as the prothorax; sides parallel and straight; together abruptly subtruncate at apex, the truncation broadly arcuate; disk cylindrically and strongly convex, with nine distinct and almost even series of fine distant subasperate punctures, the punctures of the second series from the suture much larger and with longer setæ, those of the fourth series also more distinct but much smaller than those of the second; intervals impunctate. Length 7.0 mm.; width (base of prothorax) 2.1 mm.

Texas (El Paso). Mr. G. W. Dunn.

The single specimen is a male, and the sexual characters are remarkably distinct. The third and fourth segments of the abdomen have, each, a large transversely-elliptical impression, or more appa-

rently shallow perforation, which is situated in the middle near the base, and about as wide as the length of the fifth tarsal joint; they are similar in form and position; the bottom is flat and densely spongiose, and the anterior margin bears a fringe of long closely-placed subrecumbent setæ, which extend over and partially protect the sensitive spongiose area. The long second segment is more densely pubescent than the remainder of the abdomen.

STAPHYLINIDÆ.

BLEDIUS Leach.

A partial revision of the North American species of this extensive and interesting genus has been published by Dr. LeConte (Trans. Am. Ent. Soc. VI, p. 217 *et seq.*), and, although apparently somewhat hastily drawn up, the descriptions there given will serve in most cases for purposes of identification. The species as a rule are much larger in size and more open in their habits than those of *Trogophlæus*, and it is almost certain that the proportion of known to unknown forms is much greater than in that genus, but in spite of this the number of species existing in America north of Mexico will probably be found to be in the neighborhood of one hundred and fifty. While, therefore, the time is not yet ripe for a useful monograph of our species, it is highly desirable that the large number of species discovered in recent years should be assimilated, and the revision above alluded to forms a convenient guide for the distribution of them with regard to their systematic relationship.

The groups adopted by LeConte rest in several cases upon characters which have been inaccurately stated, and therefore have not the value which apparently belongs to them. The *armatus* group, for instance, is quite composite, the coxal fissures being open in some and shorter and closed in others. When open, however, as in *strenuus*, they are not of the same form as in the *annularis* group, where they are longer, acutely triangular and gradually more widely open toward the coxæ. The antennæ in *cribricollis* and *monstratus*, with their three-jointed club, are quite different in structure from those of *armatus* and *strenuus*.

The definition, also, of the *cordatus* group by the form of the basal angles of the prothorax is unfortunate, for the form of these angles varies from the broadly rounded and completely obsolete as

in *basalis*, to the distinct and even slightly prominent as exhibited in *cordatus*. There is an undoubted bond of affiliation between the species associated by the author in the group, but it cannot be the form of the basal angles. It would be better to separate them as a group on the longer second antennal joint, which is invariably longer than the next two combined, and the convex head, with small and extremely feeble antennal prominences, or by the small unemarginate labrum, with the apical edge finely and strongly reflexed, or even by the peculiar system of coloration.

The very decided character separating the *mandibularis* group is not entirely constant, for in several, if not all the species assigned to it, the acute lateral edge is present near the apex, and in some species not assignable to it, as *monticola* and *dimidiatus*, the acute margin becomes obsolete before reaching the base, and in the latter is totally absent, almost throughout the basal sinuation.

These are matters, however, which must be reserved for a more complete study, and the new species here brought to notice are distributed in the groups as limited by LeConte, a list showing their relative positions being given under each heading.

It should be said in conclusion that the tarsi are not three-jointed as stated in the books, but more properly four-jointed. In the species allied to *armatus*, all four joints are perfectly free and distinct, but the basal joint becomes subanchylosed to the second in several species, notably in the *semiferrugineus* group, and in the *annularis* group the anchylosis is generally complete, the tarsus appearing to be three-jointed; even here, however, the suture can often be plainly seen.

Group 1.—*mandibularis*.

No additional species assignable to this group have been reported, and it is highly probable that *brevicens* Lec. will prove to be a synonym of *mandibularis* Er., the specimens before me showing all degrees of development of the mandibular tooth.

The magnitude of the triangular incision of the eighth segment in the males of this genus appears to be variable at will, the segment being composed of two overlapping parts, the edge of one forming an oblique line from one side of the apex to the opposite side of the base. When the two parts are pushed apart laterally, the notch at the apex becomes deeper, and as they are closed together it becomes smaller, preserving however the same relative form.

Group 2.—*armatus*.

The succession of species, of which a very large proportion are described below, may be stated as follows:—

<i>armatus</i> Say.	<i>agonus</i> n. sp.
<i>strenuus</i> n. sp.	<i>ineptus</i> n. sp.
<i>furtivus</i> n. sp.	<i>politus</i> Er.
<i>cribricollis</i> Lec.	<i>flavipennis</i> Lec.
<i>monstratus</i> n. sp.	<i>lectus</i> n. sp.
<i>eximius</i> n. sp.	<i>tenuis</i> n. sp.
<i>cuspidatus</i> Lec.	

B. armatus Say.—*Oxyt. arm.* Say, Journ. Ac. Phila. III, p. 155.—Rather robust and convex, black; elytra dark rufo-piceous, blackish toward suture and base; abdomen slightly paler at the apex; legs and antennæ dark piceo-rufous, the latter piceous toward apex; head and prothorax moderately shining, rather coarsely and very strongly reticulato-granulose; abdomen polished, finely reticulate. *Head* distinctly narrower than the prothorax, very feebly convex, with a few very small, feeble and indistinct punctures in the lateral depressions, having, on a line through the middle of the eyes, two large, approximate, distinct, but not very strongly elevated tubercles, the surface behind them very feebly impressed; epistomal suture fine, impressed, very distinct; antennal prominences very large and strongly elevated; each apical angle of the epistoma with a strong erect process, the apex of which is reflexed; antennæ long and rather slender; second and third joints equal in length, the latter as long as the fifth and sixth together, outer joints gradually more robust, the tenth scarcely perceptibly wider than long. *Prothorax* as wide as the base of the elytra, scarcely more than one-sixth wider than long; sides in apical three-fifths parallel and nearly straight, then broadly rounded to and through the base, the latter less strongly arcuate, the basal and lateral angles entirely obsolete; apical right, rather narrowly but distinctly rounded; apex nearly transversely truncate; disk sparsely and very unevenly punctate, the punctures impressed, very distinct but not very coarse; median groove deep, impressed, conspicuous. *Elytra* quadrate, toward apex scarcely perceptibly wider than the prothorax, about one-fourth longer than the latter, rather strongly impressed near the suture toward base, not very densely or coarsely punctate, the punctures deep and very distinct, separated by about twice their own diameters; pubescence rather sparse, moderate in length, coarse. *Abdomen* slightly narrower than the elytra, rather sparsely, finely punctate, the impressed areas impunctate; under surface finely, more densely punctate, with long coarse conspicuous pubescence. Length 5.5–6.0 mm.

New Mexico (Albuquerque). Mr. H. F. Wickham.

The above rather full diagnosis is given, as there has been more or less indecision in the identification of this species. The description is taken from the male, the female differing very slightly, the

tubercles of the front and epistoma being rudimentary. The hypomera are very feebly impressed along the outer margin; they are wide, and the apical width is equal to the length of the short, almost completely closed coxal fissures, and two-thirds as wide as the width at the fissures; the suture is obsolete, but traceable from differences in the form of reticulation. The mentum is distinctly but moderately impressed throughout the width toward base, the short coriaceous hypoglottis being separated by a fine deep suture.

In the two following species only those characters are mentioned which differ from the corresponding ones of *armatus*; in other respects they are similar.

B. strenuus n. sp.—Robust, moderately convex, black, the elytra sometimes dark piceo-rufous as in *armatus*. Head much narrower than the prothorax; epistomal suture very coarse, deep and distinct; antennæ piceous-black throughout, nearly as in *armatus*. Prothorax slightly wider than the base of the elytra, one-third wider than long; sides in slightly more than apical two-thirds nearly straight and very feebly but distinctly divergent from the apex, then strongly convergent, at first nearly straight then broadly rounded into the base, without trace of basal angles, the base more feebly arcuate; lateral angles obtuse but very narrowly rounded and distinct, apical very slightly obtuse, rather narrowly but distinctly rounded; apex transversely truncate; punctures rather more densely and evenly distributed than in *armatus*. Elytra very slightly wider than long, at apex scarcely perceptibly wider than the prothorax, the sides slightly divergent and nearly straight, between one-fourth and one-third longer than the prothorax. Abdomen very slightly narrower than the elytra. Length 6.0 mm.

California.

The description is taken from the male, of which I found a single specimen in the brackish marsh behind the ocean beach at San Francisco. There is an entirely similar specimen from the same locality in the cabinet of Dr. LeConte. With these I have associated a large number of specimens taken at Los Angeles, which differ only in the sides of the prothorax being parallel and not divergent from the apex as in the San Francisco specimens—they, however, probably represent a variety, as the coxal fissures are distinctly shorter and more nearly closed. The species differs from *armatus* in its much more transverse prothorax, rather more robust form, and distinct lateral prothoracic angles.

The hypomera are wide, very feebly impressed laterally, the apical width being slightly more than one-half that at the coxal fissures; the latter are longer than in *armatus*, being nearly as long as the

width of the hypomera at their apex, and are distinctly open, the sides however being parallel, and not angulate and more open toward the coxæ, as in the *annularis* group. The sutures are entirely obsolete, and the mentum is nearly as in *armatus*.

B. furtivus n. sp.—General form and sculpture nearly as in *armatus*, the tubercles of the vertex being smaller and more approximate, and the epistomal processes shorter; outer joints of antennæ very slightly more transverse. *Prothorax* scarcely perceptibly narrower than the base of the elytra, rather strongly transverse, two-fifths wider than long; sides parallel and straight, strongly convergent in basal third and nearly straight, the basal angles very obtuse and very broadly rounded, but more distinct than in *strenuus*; lateral angles obtuse but very narrowly rounded and distinct, apical right and very broadly rounded, the apex broadly and very distinctly arcuate throughout the width, otherwise nearly as in *strenuus*. *Elytra* scarcely as long as wide, about two-fifths longer and, near the apex, fully one-fourth wider than the prothorax, the sides distinctly divergent. *Abdomen* entirely impunctate along a broad and distinct median line, finely and rather densely punctate beneath. Length 5.0 mm.

Oregon (The Dalles). Mr. H. F. Wickham.

Although the abdominal punctures are sparser along the middle in *armatus*, there is no well-defined line in which they are entirely absent, as in *furtivus*; this line is, however, broad and almost entirely free from punctures in *strenuus*.

This species, the description of which is taken from the male, differs greatly from *armatus* in its much shorter and more transverse prothorax, with distinct lateral angles, and from *strenuus* in the broadly rounded apex and apical angles of the same part. The prosternal sutures are more distinct than in either of the preceding species, and because of the greater depression of the apical angles of the pronotum, the hypomera are, at apex, distinctly less than one-half as wide as at the coxal fissure; the latter is slightly shorter than the hypomeral width in continuation of it, and is narrowly open, being intermediate between the same part in *armatus* and *strenuus*. The hypomera are not distinctly impressed externally. The mentum is nearly as in the two preceding species.

The three species *armatus*, *strenuus* and *furtivus*, although closely allied, are almost undoubtedly distinct; if however this should prove not to be the case, the structure of the prosternum and hypomera must be considered of very little value, even in the separation of species.

B. monstratus n. sp.—Rather slender and convex, parallel, dark testaceous; abdomen dark piceous-brown; elytra paler, flavate throughout; legs and antennæ flavate; head strongly shining, reticulato-granulose, the median tubercles, antennal prominences and apical part of the epistoma highly polished and not reticulate; pronotum polished, very feebly reticulate near the punctures; abdomen moderately shining, very strongly reticulate. *Head* very small, much narrower and shorter than the prothorax; eyes moderately prominent; on a line through their apical third there are two very approximate prominent tubercles, behind and between which there is a short feeble canaliculation; between them and the large prominent antennal tuberculations there are a few small, rather distinct punctures; suture short, transverse, feeble, not impressed, situated immediately before the tubercles of the vertex; apical angles of the epistoma tuberculate, the tubercles gradually obsolete posteriorly, and slightly more approximate than the angles; antennæ rather short and slender, the three last joints abruptly wider forming a club; second distinctly longer than the third, four to seven moniliform and subglobular, eighth slightly wider, transversely oval, ninth and tenth strongly transverse, eleventh short, ovoidal, slightly narrower than the tenth, longer than wide. *Prothorax* large, about one-fourth wider than long; sides from near the apex to basal fifth parallel and straight, then abruptly, broadly rounded into the base, without trace of basal or lateral angles, the base broadly distinctly arcuate, the apex transversely truncate; apical angles right and distinctly rounded; disk extremely coarsely punctate, the punctures very strongly and broadly impressed, deep, distant by rather less than their own diameters anteriorly, becoming much finer and sparse toward base; median groove wide, entire, very broadly and deeply impressed, conspicuous. *Elytra* scarcely as long as the prothorax and very distinctly narrower, scarcely as long as wide, very broadly and just visibly impressed on the suture at the base; sides very feebly divergent; surface very finely and densely punctate, the punctures distant by nearly twice their own diameters; pubescence dense, moderate in length. *Abdomen* just visibly wider from base to apex, at which point it is fully as wide as the elytra; sides straight; surface very finely, feebly, indistinctly and rather sparsely punctate, rather finely, more distinctly and densely so beneath. Length 3.8–4.3 mm.

California (San Francisco).

The type of this interesting and very distinct species is a male, but possesses no decided sexual modification at the apex of the abdomen. It is closely related to *cribricollis* Lec., but is immediately distinguishable by its very large prothorax and small elytra. It should form, together with *cribricollis*, a group distinct from the *armatus* group of LeConte, because of its very short completely closed coxal fissures, and three-jointed antennal club.

The apical angles of the pronotum are abruptly and strongly deflexed, the hypomera wide, very deeply and broadly concave throughout, the coxal fissures extremely short, closed and directed

strongly and obliquely forward. The sutures are obsolete. The mentum is almost flat, shining and reticulate. The color occasionally becomes very pale flavate-brown throughout.

B. eximius n. sp.—Rather narrow and depressed, subparallel, black; prothorax pale, red-brown; elytra same, slightly clouded with piceous toward base; abdomen paler at apex, black beneath; legs and antennæ testaceous, the latter infusate toward apex; head very slightly shining, finely, rather strongly granulose; pronotum distinctly shining, finely and rather strongly granulato-reticulate; abdomen polished, finely reticulate, more strongly so toward apex. *Head* distinctly narrower than the prothorax, very feebly convex, with a few small scattered punctures laterally; vertex with an elongate feeble impressed fovea, on either side of which the surface is very feebly swollen; epistomal suture strong, arcuate, broadly impressed; anterior angles of the epistoma strongly tuberculate; antennal prominences large and very strong, their apices externally finely and strongly margined with an elevated bead; antennæ moderate in length, rather strongly, gradually incrassate; third joint rather longer than the second and as long as the fourth and fifth combined, tenth fully three-fourths wider than long. *Prothorax* just visibly narrower than the base of the elytra, one-fourth wider than long; sides in rather more than apical two-thirds parallel and straight, then convergent and straight for a short distance, then broadly rounded into the base without trace of basal angles; base transverse; apex just visibly arcuate; apical angles right and extremely narrowly rounded, lateral very obtuse, broadly rounded and not distinct; disk rather coarsely, sparsely and very unevenly punctate; median groove wide, very deeply impressed, entire and conspicuous. *Elytra* fully as long as wide, one-fifth wider and one-half longer than the prothorax; sides nearly straight, slightly divergent; surface very feebly impressed on each side of the suture at base, rather coarsely, moderately densely and deeply punctate, the punctures generally separated by nearly twice their own widths; pubescence rather long, distinct but not very dense. *Abdomen* at apex nearly as wide as the elytra, at base much narrower; sides straight and distinctly divergent; surface finely, rather sparsely punctate, finely and densely so beneath, with the surface finely granulato-rugulose and somewhat dull. Length 5.5 mm.

California (San Diego).

The hypomera are flat, but strongly depressed below the lateral edges, the latter being very prominent and acute throughout; at apex the width is fully three-fourths that at the fissures, which are but slightly shorter than the adjacent hypomeral width, and narrowly but very distinctly open; the prosternal sutures are almost completely obliterated but rather distinctly traceable. The mentum is shining, coarsely and very strongly reticulate, and broadly im-

pressed throughout the width, the terminal membranous hypoglottis almost one-third as long.

The description of this very distinct species is taken from the male, the eighth ventral segment being very deeply incised, the seventh broadly cusped. It should be placed near *cuspidatus*.

B. agonus n. sp.—Slender, moderately depressed; sides parallel; piceous, elytra rufo-testaceous, broadly and indefinitely clouded with darker castaneous toward the suture and base; abdomen black; legs throughout and coxæ pale flavate; antennæ brownish-rufous. *Head* very slightly narrower than the prothorax, feebly shining, densely, coarsely granulato-reticulate, not distinctly punctate; eyes rather large and prominent, the setæ very short and sparse; antennal prominences strong, the epistomal suture slightly impressed; vertex not tuberculate, but having a large rounded rather deeply-impressed puncture; antennæ moderate, second joint one-third longer and more robust than the third, four to six much shorter, submoniliform, six to eight rapidly wider; outer joints strongly transverse, eleventh ovoidal, scarcely as long as the two preceding together. *Prothorax* as wide as the base of the elytra, about one-third wider than long; sides in anterior two-thirds parallel and almost straight, then convergent and arcuate to the base which is transverse; basal angles very obtuse and rounded, lateral rounded and entirely obliterated, apical right and narrowly rounded; apex transverse; disk feebly shining, densely, coarsely granulato-reticulate, rather finely but distinctly, very sparsely and somewhat unevenly punctate, the pubescence very sparse but rather long; median groove very fine and feebly impressed. *Elytra* very slightly longer than wide, about two-thirds longer than the prothorax, very finely, feebly and sparsely punctate, the punctures separated by about three times their own diameters, but much closer than those of the pronotum; sides nearly parallel; pubescence very sparse and short. *Abdomen* as wide as the prothorax, shining, rather finely, densely and strongly reticulate throughout, finely and very sparsely punctate, the under surface more densely so and distinctly reticulato-rugulose. Length 4.5 mm.

Utah.

The mentum is broadly and deeply impressed especially toward base, and the anterior angles of the epistoma are distinctly tuberculate in the male.

A very distinct species which should be associated with *cuspidatus*.

B. ineptus n. sp.—Rather slender and convex, piceous; elytra pale flavate, the suture narrowly dusky, more broadly so toward base; legs and antennæ flavate, the latter infusate toward apex; head finely, strongly granulato-reticulate, feebly shining; pronotum feebly reticulate throughout, except along the median line where the surface is polished and the reticulation obsolete, rather strongly shining; abdomen polished but distinctly, evenly reticu-

late throughout. *Head* very distinctly narrower than the prothorax, very feebly convex, with a few fine scattered and indistinct punctures; median fovea small, the surface before it slightly tumid; suture transverse, rather broadly impressed, distinct; antennal tuberculations rather small, widely distant, rather strongly elevated; antennæ moderate, gradually, rather feebly incrassate; second joint more robust and very much longer than the third, ninth and tenth not much longer than the eighth, distinctly wider than long. *Prothorax* scarcely perceptibly narrower than the base of the elytra, one-fourth wider than long; sides except in basal fourth and apical sixth, parallel and straight, strongly convergent and feebly arcuate to the basal angles, which are very obtuse and broadly rounded, although slightly definable; lateral angles broadly rounded and not very distinct, apical right, broadly and distinctly rounded; apex transversely truncate; base just visibly arcuate; disk rather abruptly and very strongly convex near the apical, basal and lateral margins, finely, feebly, very sparsely and somewhat unevenly punctate, the median line rather broadly impunctate, the median groove almost completely obsolete, only imperfectly visible under certain angles of illumination. *Elytra* very slightly wider and about two-fifths longer than the prothorax, fully as long as wide; sides nearly straight, scarcely visibly divergent; disk very feebly impressed near the suture toward base, somewhat finely and sparsely but distinctly punctate, the punctures separated by rather more than twice their own diameters; pubescence very sparse, moderate in length. *Abdomen* parallel, slightly narrower than the elytra, very finely and sparsely punctate, beneath more coarsely unevenly and rather sparsely punctate. Length 4.2-4.7 mm.

New Mexico (Albuquerque), Mr. Wickham; Texas (El Paso), Mr. Dunn.

The hypomera are wide, rather flat but very feebly impressed near the lateral edges, the coxal fissures short, about two-thirds as long as the adjacent hypomeral width and narrowly but distinctly open; the prosternal sutures are almost completely obsolete. The mentum is flat, scarcely perceptibly and indefinitely concave, coarsely but very feebly reticulate, polished, the terminal membranous hypoglottis strongly developed, nearly one-third as long as the chitinous portion. The anterior angles of the epistoma are finely and very strongly tuberculate in the male.

This species should be placed near *politus*. It is rather closely allied to *agonus*, but differs in its distinctly narrower head, more broadly rounded apical angles of the prothorax, the latter being distinctly less transverse, and in its shorter, more coarsely deeply and densely punctate elytra.

B. lectus n. sp.—Rather slender, subparallel, black; pronotum paler, piceo-rufous; elytra bright rufous, very broadly clouded with piceous-black toward suture and base; legs and antennæ pale testaceous, the latter slightly

infusate; head rather finely and strongly, pronotum more coarsely and feebly reticulate, the latter rather strongly shining; abdomen polished, rather coarsely evenly and feebly reticulate. *Head* slightly narrower than the prothorax, feebly convex; eyes rather large, moderately and evenly convex; median puncture very small and feeble; vertex not tuberculate; antennal prominences rather large and strong; suture distinct; apical angles of the epistoma slightly tumid; antennæ rather long and slender, gradually and moderately incrassate; second joint more robust and distinctly longer than the third, fifth longer than wide, tenth very slightly wider than long, the eleventh one-half longer than wide, rather acutely and gradually pointed. *Prothorax* scarcely perceptibly narrower than the base of the elytra, just visibly wider than long; sides except in basal fourth parallel and nearly straight, then convergent and perfectly straight to the basal angles, which are very obtuse but rather narrowly rounded and definable although not distinct; lateral angles obtuse, narrowly rounded and distinct, apical nearly right, very narrowly rounded; apex broadly and very distinctly arcuate; base very feebly so; disk rather convex, very finely and sparsely punctate, the punctures very feebly impressed although distinct, very unevenly distributed; median groove very fine, feebly impressed, entire; pubescence very easily abraded and inconspicuous. *Elytra* as long as wide, one-fourth wider and scarcely more than one-third longer than the prothorax; sides distinctly divergent and feebly arcuate, distinctly so toward apex; surface feebly impressed near the suture almost throughout the length, somewhat deeply and densely punctate, the punctures rather larger and much more distinct than those of the pronotum, separated by slightly more than their own diameters; pubescence short, fine, sparse and inconspicuous. *Abdomen* parallel, distinctly narrower than the elytra, finely, sparsely punctate, finely and densely so beneath. Length 4.2 mm.

California (Sonoma Co.).

The hypomera are narrowly and strongly impressed along the outer edge, the width at the apex being fully two-thirds as great as at the fissures; the latter are very short, scarcely two-thirds as long as the adjacent hypomeral width, and are distinctly and rather widely open; the prosternal sutures are almost completely obsolete, although traceable. The mentum is shining, coarsely and strongly reticulate and very feebly concave, the hypoglottis very short.

Belongs near *flavipennis* Lec., from which it is at once distinguishable by its narrower form, less distinct prosternal impressions in front of the coxal fissures, less widely open fissures, different coloration and very different sexual characters. It is described from the male, the eighth segment of the abdomen being deeply and narrowly incised.

B. tenuis n. sp.—Slender, black; pronotum brown; elytra paler, brownish-flavate, very feebly clouded toward the suture near the base; legs through-

out and coxæ pale flavate; antennæ brownish-testaceous, paler toward base; head and pronotum moderately shining, densely and strongly granulose and granulato-reticulate respectively; abdomen polished, reticulate. *Head* almost as wide as the prothorax; eyes moderate, setæ very short; antennal prominences very strong; suture feebly impressed; surface very sparsely and not distinctly punctate, vertex not tuberculate, having a somewhat elongate impressed median fovea; antennæ rather slender and elongate; second joint longer and slightly more robust than the third, four to six subequal and submoniliform, six to nine very gradually more robust and transverse, nine and ten equal, about one-third wider than long, eleventh ovoidal, distinctly shorter than the two preceding together. *Prothorax* slightly narrower than the base of the elytra, one-fourth wider than long; sides in anterior two-thirds parallel and straight, then strongly arcuate and moderately convergent to the basal angles, which are obtuse, not rounded, and minutely prominent; lateral angles entirely obsolete, broadly rounded, apical right, very narrowly rounded; base and apex just visibly arcuate; disk somewhat coarsely feebly very sparsely and somewhat unevenly punctate, the pubescence rather long and stout; median groove extremely fine and feebly impressed. *Elytra* slightly shorter than wide, about one-half longer than the prothorax, and, toward apex, nearly one-third wider; sides slightly divergent, broadly feebly arcuate, very feebly emarginate at apex, the inner angles slightly rounded; disk impressed on the suture behind the scutellum, somewhat coarsely but feebly and sparsely punctate, the punctures distant by from two to three times their own diameters, closer and smaller than those of the pronotum; pubescence fine, sparse and moderate in length. *Abdomen* much narrower than the elytra, slightly wider than the prothorax, finely, very sparsely punctate, much more densely so and densely pubescent beneath toward the sides. Length 4.5 mm.

Nevada.

The hypomera are distinctly narrowly impressed near the margin, and are rather wider than the distance thence to the coxæ, the coxal fissures being narrowly open and short. The mentum is broadly feebly impressed. The anterior angles of the epistoma, at least in the male, are finely and feebly tuberculate. It is closely allied to *lectus*, but differs in its more slender form and smaller more transverse prothorax.

The prosternal sutures are obliterated and the mentum is margined at apex with a very thick convex bead—hypoglottis—separated by a fine deep groove.

Group 3.—*semiferrugineus*.

But few new species are to be assigned to this group, as may be seen from the following complete list:—

<i>turgidus</i> n. sp.	<i>opacifrons</i> Lec.
<i>semiferrugineus</i> Lec.	<i>rubiginosus</i> Kr.
<i>rotundicollis</i> Lec.	<i>gravidus</i> n. sp.
<i>fumatus</i> Lec.	<i>analis</i> Lec.
<i>foraminosus</i> n. sp.	<i>nitidicollis</i> Lec.
<i>nitidiceps</i> Lec.	<i>assimilis</i> n. sp.

B. *turgidus* n. sp.—Rather robust, parallel, somewhat convex, black; elytra bright rufous, the base piceous-black, the same color extending along the suture, very narrowly so toward apex; legs and antennæ testaceous, the latter infusate toward apex; head and pronotum rather strongly shining, but densely and rather strongly granulato-reticulate; abdomen polished, finely, feebly reticulate throughout. *Head* much narrower than the prothorax, not very convex; eyes rather small; surface with a few widely scattered, moderately distinct punctures; basal transverse line very strongly impressed, the median fovea small but distinct, being an angular break in the continuity of the groove; tuberculations wanting; antennal prominences rather strong; suture fine but distinct; antennæ rather slender, gradually and moderately incrassate from the sixth joint, moderately compressed; outer joints slightly transverse, second distinctly shorter than the next two together. *Prothorax* slightly wider than the base of the elytra, one-third wider than long; sides in anterior three-fourths parallel and very feebly arcuate, then convergent and very feebly arcuate, distinctly sinuate for a short distance before the basal angles, which are slightly obtuse, not distinctly rounded and somewhat prominent; lateral angles broadly rounded, not very distinct, apical slightly obtuse and narrowly rounded; apex fully two-fifths wider than the base, both transversely truncate; disk somewhat coarsely, very sparsely and distinctly punctate, the punctures unevenly distributed and deeply impressed; pubescence very short, sparse and inconspicuous; median groove very fine, feebly impressed, obsolete in apical two-fifths. *Elytra* distinctly wider than long, scarcely one-fourth longer than the prothorax, and, at apex, not visibly wider; sides rather strongly divergent, feebly arcuate; apex rather strongly, conjointly emarginate in the middle; surface with a small elongate impression on each side of the suture at the base, not very coarsely, somewhat sparsely and unevenly punctate; punctures rather deep and distinct, impressed, separated by from two to three times their own diameters; pubescence moderate in length, fine, rather sparse. *Abdomen* nearly as wide as the elytra, finely, very sparsely punctate, finely, rather sparsely so beneath. Length 4.5 mm.

Colorado (Ft. Garland). Mr. E. A. Schwarz.

The hypomera are wide, about as wide as the length of the coxal

fissures; they are nearly flat anteriorly but strongly impressed near the lateral edge posteriorly, the sutures distinct, the fissures moderate in length and not entirely closed, the posterior edge below the anterior appearing closed when viewed vertically, but widely open near the coxæ. The mentum is moderate, shining, coarsely reticulate and nearly flat.

This very distinct and beautiful species belongs, because of its distinct sutures and half-closed coxal fissures, in the *semiferrugineus* group of LeConte, but differs from every described species in its prominent basal angles of the prothorax.

B. foraminosus n. sp.—Rather robust and convex, black; elytra rufous, clouded with piceous-black toward base; legs and antennæ dark testaceous, the latter blackish toward apex; head finely reticulato-granulose, moderately shining; pronotum polished, not reticulate; abdomen polished, finely feebly reticulate. Head slightly narrower than the prothorax, slightly convex; eyes rather small; surface distinctly and rather densely punctate; median fovea deep, distinct and slightly elongate, the surface immediately about it polished and inpunctate; suture fine, feebly arcuate, distinct but not impressed; antennal prominences rather large but short and not very strongly elevated; antennæ rather robust and compact, moderate in length, very evenly and distinctly incrassate; second joint but slightly longer than the third, sixth distinctly wider than long, six to eight subequal in length, increasing in width, nine and ten abruptly much longer but not wider, the latter rather longer than wide, eleventh long, gradually pointed. Prothorax slightly narrower than the base of the elytra, one-fourth wider than long; sides in apical three-fifths parallel and straight, then convergent and just visibly arcuate, and then broadly rounded into the base, the basal angles being very obtuse, broadly rounded and not distinct; lateral angles very obtuse but rather narrowly rounded and quite distinct, apical right and distinctly rounded; apex broadly, very feebly arcuate, the base very distinctly arcuate; disk rather coarsely, very deeply and densely punctate, the punctures almost contiguous laterally but a little more dispersed toward the median groove, which is very coarse, deep and conspicuous. Elytra scarcely as long as wide, one-fifth wider and one-third longer than the prothorax, not very coarsely but very deeply and rather densely punctate, the punctures separated by slightly more than their own widths; pubescence moderate in length, not very dense. Abdomen parallel, almost as wide as the elytra, feebly, finely and not very densely punctate, beneath polished and more densely punctate. Length 5.5 mm.

California (Lake Co.). Mr. Fuchs.

This species is allied to *fumatus* Lec., but differs greatly in its smaller eyes, straight and not broadly rounded sides of the prothorax, deeper and more distinct punctuation of the head, and, especially, in the structure of the antennæ which in *fumatus* are

more slender, and much more feebly incrassate, with joints six and seven distinctly longer than wide, and eight fully as long as wide, nine and ten much less abruptly longer than eight; in the present species the eighth joint is nearly one-half wider than long. The description is taken from the only specimen which I have seen, and this is unfortunately the female, but the above comparison has been made with the same sex of *fumatus*.

The hypomera are flat, rather wide, the apical width fully one-half that at the fissures, the latter rather long but slightly shorter than the hypomeral width in continuation of them, and are almost completely closed; the prosternal sutures are very distinct, being defined by a fine elevated line. The mentum is shining, coarsely reticulate, finely, deeply impressed along the base and unusually coarsely, deeply but very sparsely punctate.

B. gravidus n. sp.—Moderately robust, rather convex, piceous; elytra bright rufous, feebly clouded with piceous toward base, and slightly along the suture; abdomen above and beneath dark rufo-testaceous, the apices of the segments clouded with piceous; head finely reticulate, feebly shining; pronotum distinctly reticulate, rather strongly shining, the reticulation obsolete posteriorly toward the sides, the surface becoming polished; abdomen polished, finely, very feebly and subobsoletely reticulate. *Head* rather distinctly narrower than the prothorax, feebly convex, finely, sparsely and not very distinctly punctate, not tumid in the middle, the median puncture small, rounded, feebly impressed, not surrounded by a polished area; antennal tuberculations large, short, moderately prominent, polished toward apex; suture fine, feebly arcuate, not impressed; apical angles of the epistoma distinctly tuberculate; eyes large, more convex behind; antennae rather long, the last five joints gradually, evenly and moderately incrassate; second joint scarcely perceptibly longer, although distinctly more robust than the third, sixth slightly wider than long, eighth about one-third wider than long, ninth and tenth longer, the latter slightly wider than long, eleventh one-half longer than wide. *Prothorax* rather distinctly narrower than the base of the elytra, nearly one-third wider than long; sides from apical fourth to just behind the middle parallel and straight, then convergent and just visibly arcuate to the basal angles, which are very obtuse, rather broadly rounded although somewhat definable; lateral angles obtuse, very broadly rounded and not distinct; sides in apical fourth convergent and strongly arcuate, the angles at the apex being slightly obtuse and scarcely at all rounded; apex transversely truncate; base just visibly arcuate; disk convex, finely, sparsely and unevenly punctate, the punctures distinct but not very deep, the median groove rather fine but deeply impressed and distinct. *Elytra* not quite as long as wide, together broadly, angularly emarginate at apex, one-fourth wider and one-third longer than the prothorax; sides feebly divergent; disk flattened but not distinctly impressed on the

suture at the base, rather finely but distinctly and densely punctate, the punctures separated by but very slightly more than their own diameters; pubescence moderate in length. *Abdomen* parallel, distinctly narrower than the elytra, rather finely but not very densely punctate toward the apices of the segments, polished and moderately densely punctate beneath. Length 5.0-5.7 mm.

New Mexico (Albuquerque). Mr. H. F. Wickham; Utah.

The hypomera are broadly, very feebly impressed along the outer edge, the apex about three-fifths as wide as the width at the fissures, the latter rather long, fully as long as the adjacent hypomerical width, and almost completely closed, the prosternal sutures distinct. The mentum is not visibly punctate, shining, coarsely reticulate and distinctly impressed along the base.

The description of this distinct species is taken from the male, the sixth segment being evenly emarginate in circular arc, the emargination simple, not margined with membrane, and about five times as wide as deep; the surface at the sides of the emargination bears several very long, erect, interlacing setæ. It should be placed near *rubiginosus* Er.

The punctures of the pronotum vary in size, and in some specimens are slightly coarser.

B. assimilis n. sp. (Fauvel MS.).—Rather slender and convex, black; elytra piceous; legs and antennæ pale flavate, the latter infusate except toward base; head and prothorax finely, densely granulate, feebly shining; abdomen polished, finely, feebly reticulate. *Head* scarcely perceptibly narrower than the prothorax, rather convex, finely, very obsolete punctate, not tuberculate; median fovea small, feebly impressed; antennal prominences small, feeble; suture fine, distinct, not impressed, arcuate; epistoma simple; antennæ rather long, moderately and gradually incrassate; second joint distinctly longer than the third, four to six decreasing in length, the latter distinctly wider than long, seventh longer, slightly wider than long, eight to ten increasing in length, the latter longer than wide, eleventh nearly twice as long as wide, shorter than the two preceding together; last three joints together as long as the preceding six. *Prothorax* slightly but distinctly narrower than the base of the elytra, about one-fourth wider than long; sides in anterior two-thirds parallel and straight, then convergent and nearly straight to the basal angles, which are obtuse, narrowly rounded, rather distinct but not at all prominent; lateral angles obtuse, narrowly rounded and rather distinct, apical right and distinctly rounded; apex almost transversely truncate; disk very densely and somewhat deeply punctate, the punctures moderate in size, separated by scarcely their own diameters but slightly sparser toward the median impunctate line, which is entire and moderate in width, the median groove being completely obsolete. *Elytra* nearly as long as wide, two-fifths longer,

and rather more than one-third wider than the prothorax, feebly impressed near the suture toward base, rather finely punctate, the punctures distinct, rather smaller than those of the prothorax, and separated by nearly twice their own diameters. *Abdomen* slightly narrower than the elytra, gradually wider from base to apex, finely, somewhat densely punctate, beneath polished, finely, somewhat densely punctate. Length 3.3 mm.

Illinois; Iowa.

The description is taken from the male, and the sexual characters at the apex of the abdomen are, as usual in the *semiferrugineus* group, very strongly marked, in this case more remarkable than in any other species which I have seen, and reminding us somewhat of the male modification in *Apocellus*.

The sixth segment is broadly, strongly emarginate in circular arc nearly throughout the width, the emargination bordered with a wide and thin, very slightly inflexed membrane; at each side of the emargination there is a small, acute, pointed tooth; the seventh segment is slightly produced and rounded in the middle, the eighth as usual obliquely divided, the two overlapping portions having an acute apical incisure, which can apparently be varied at will.

The hypomera are wide, flat, the suture distinct; the coxal fissures very short, almost completely closed; the mentum shining, reticulate, very feebly, transversely impressed near the base. The species should be placed immediately after *nitidicollis* Lec.

Group 4.—*annularis*.

This group is by far the most extensive of the genus; the species may be provisionally arranged in the following order:—

punctatissimus Lec.	ruficornis Lec.
villosus n. sp.	languidus n. sp.
laticollis Lec.	bicolor n. sp.
nebulosus n. sp.	divisus Lec.
longipennis Mäkl.	pleuralis Lec.
luteipennis Lec.	diagonalis Lec.
monticola n. sp.	parvicollis n. sp.
sinuatus Lec.	tau Lec.
gentilis n. sp.	ornatus Lec.
gracilis n. sp.	suturalis Lec.
annularis Lec.	phytosinus Lec.
stabilis n. sp.	cognatus Lec.
confusus Lec.	emarginatus Say.
adustus n. sp.	troglodytes Er.
	honestus n. sp.

B. villosus n. sp.—Moderately robust, piceous-black, paler beneath; elytra pale brownish, the suture and base slightly and indefinitely darker; legs and antennæ pale flavo-testaceous, the latter infusate; head and pronotum strongly shining, finely and very feebly reticulate; abdomen polished, very minutely, feebly reticulate, the basal impressions very much more coarsely and strongly so. *Head* distinctly narrower than the prothorax, not distinctly convex, with a few scattered, well-defined punctures, not tuberculate; basal transverse groove broadly impressed, strong; median fovea rather badly defined; antennal tuberculations small but distinct; suture fine and feeble, almost completely obliterated in the middle; antennæ rather long, gradually and moderately incrassate; outer joints slightly transverse; second much shorter than the next two together, fourth and fifth longer than wide. *Prothorax* distinctly narrower than the base of the elytra, one-fourth wider than long; sides in anterior three-fifths just visibly divergent from the apex, and very feebly arcuate, then convergent and feebly arcuate, broadly and very feebly sinuate before the basal angles, which are very obtuse, rounded and not at all prominent although definable; lateral angles broadly rounded, not very distinct, apical obtuse, distinctly rounded; apex nearly two-fifths wider than the base, both broadly, feebly arcuate; disk very feebly convex, rather finely, densely punctate, the punctures deep and well defined, sparser near the apex and median groove, the latter very deep, widely impressed and conspicuous throughout; pubescence very long. *Elytra* subquadrate, distinctly wider at apex than at base, one-third wider and one-half longer than the prothorax; sides feebly arcuate toward apex; surface feebly impressed along the suture in basal half, coarsely, very deeply and densely punctate; punctures separated by from less than to slightly more than their own diameters, very deep and perforate and distinctly larger than those of the pronotum; pubescence very long, rather dense, cinereo-flavate and conspicuous. *Abdomen* slightly narrower than the elytra, rather coarsely and densely punctate upon the convex portions, the basal impressions impunctate, beneath densely punctate, the pubescence very long. Length 5.0 mm.

California.

A very well-marked species in its extremely long conspicuous pubescence, almost twice as long as in any other known to me. The hypomera are about one-half as wide as the distance thence to the coxæ, nearly flat anteriorly, strongly impressed along the middle, the sutures almost completely effaced, the coxal fissures very long and widely open. The mentum is very deeply impressed in the middle toward base, almost excavated, highly polished and quite devoid of reticulation, except near the lateral edges and sometimes near the apex.

For the present *villosus* may be associated with *laticollis*.

B. nebulosus n. sp.—Rather robust, nearly parallel, black; elytra pale rufo-ferruginous, indefinitely clouded with piceous-black toward the suture,

especially toward the base; abdomen piceous-black, rufo-piceous beneath; metasternum black; legs and antennæ pale testaceous, the latter infusate toward apex; head and pronotum feebly shining, rather coarsely and strongly granulato-reticulate; abdomen finely, evenly and feebly reticulate throughout, polished. *Head* slightly narrower than the prothorax; eyes large; surface rather depressed, finely, very sparsely and indistinctly punctate, not tuberculate; median fovea rounded, distinct; transverse impressed line distinct; antennal tuberculations small, feeble; suture fine, feebly defined; antennæ rather strongly incrassate; second joint more robust and nearly as long as the next two, five to seven increasing gradually in width, eight to ten wider, two-thirds wider than long, eleventh not as long as the two preceding combined. *Prothorax* just visibly narrower than the base of the elytra, nearly one-half wider than long; sides in anterior two-thirds parallel and broadly but distinctly arcuate, then convergent and straight to the basal angles, which are obtuse, slightly rounded, rather distinct but not at all prominent; lateral angles broadly rounded, not distinct, apical slightly obtuse and very narrowly rounded; apex truncate, less than one-third wider than the base, which is broad and feebly arcuate; disk rather finely and sparsely punctate, the punctures deep and distinctly defined, slightly closer toward base; pubescence moderate in length, sparse, pale flavate; median groove rather fine but very deeply impressed and conspicuous. *Elytra* nearly as long as wide, one-half longer and nearly one-fourth wider than the prothorax; sides straight, slightly divergent; surface distinctly impressed near the suture at base, densely, rather finely punctate, the punctures very deep and distinct and separated by slightly more than their own diameters; pubescence fine, moderate in length. *Abdomen* nearly as wide as the elytra, very finely, sparsely punctate; under surface finely and rather sparsely so. Length 3.9 mm.

Iowa.

The hypomera are moderate in width, deeply concave throughout, the lateral edges being very prominent; sutures distinct; coxal fissures moderate in length, widely open. The mentum is large and extremely feebly concave throughout its extent; it is rather shining and coarsely reticulate, the membranous hypoglottis very short, inflexed and inconspicuous.

Belongs near *laticollis*, but is well distinguished by its more shining head and pronotum, the punctures of the latter being better defined and the basal angles rather more distinct, by its relatively larger and more finely punctate elytra, less concave mentum, much wider pronotal hypomera, shorter coxal fissures, and larger but less prominent eyes.

B. monticola n. sp.—Rather slender, black; elytra and antennæ piceous-black, the latter very slightly paler toward base; legs rufous; head and prothorax dull, densely granulose; elytra and abdomen polished, the latter

reticulate, much more strongly so toward base. *Head* very nearly as wide as the prothorax; eyes rather small, very prominent; antennal prominences rather large, moderately conspicuous; suture fine but distinct; surface behind the suture dull and densely granulate, finely, rather densely but very indistinctly punctate; vertex neither tuberculate nor foveate, rather convex; epistoma shining, coarsely reticulate; antennæ rather robust; second joint nearly as long as the next two, third but slightly shorter than the fourth and fifth together, four to six short, the latter transverse, seven to ten rather abruptly wider and gradually longer, the tenth nearly two-thirds wider than long, eleventh short, much shorter than the two preceding combined. *Prothorax* distinctly narrower than the base of the elytra, scarcely one-fifth wider than long; sides in anterior two-thirds parallel and very slightly arcuate, then convergent and feebly sinuate to the basal angles, which are obtuse and very narrowly rounded, not at all prominent, the acute lateral edge entirely disappearing just before attaining them; lateral angles very obtuse and rounded but somewhat distinct, apical distinctly rounded; apex about one-third wider than the base, both truncate; disk rather convex, very densely but somewhat indistinctly punctate, densely but not distinctly pubescent, the median groove rather fine but deep and distinct. *Elytra* quadrate, scarcely one-fourth wider and two-fifths longer than the prothorax, rather convex, broadly impressed toward base near the suture; sides parallel; disk rather coarsely, very densely and deeply punctate, the punctures separated by scarcely more than one-half their own diameters, the intervals polished although feebly rugulose; pubescence moderate in length, rather coarse and dense, flavo-cinereous and conspicuous. *Abdomen* very slightly narrower than the elytra, finely, sparsely punctate, rather coarsely and densely so beneath. Length 2.8 mm.

California (Lake Tahoe, 6200 feet).

A small species, quite distinct in its very* dense punctuation; the absence of an acute lateral margin near the basal angles of the prothorax will distinguish it from its nearest allies; it should be placed near *sinuatus* Lec.

The hypomera are very broadly, feebly concave and rather more than one-half as wide as the distance thence to coxæ, the sutures distinct, the coxal fissures moderate in length and widely open. The mentum is shining, coarsely reticulate and broadly, rather strongly impressed in the middle throughout its length, the coriaceous hypoglottis very short and not distinct.

B. gentilis n. sp.—Rather slender and convex, black throughout; legs rufo-testaceous; an enné black, the two basal and eleventh joints paler, piceo-testaceous; head and pronotum feebly shining, the former finely granulose, transversely reticulate near the base, the latter more coarsely granulate-reticulate and shining; elytra and abdomen polished, the latter coarsely reticulate throughout, the lines very fine. *Head* very slightly narrower than the pro-

thorax, rather strongly convex, completely devoid of fovea or tuberculations; antennal prominences small and feeble; epistomal suture fine, feeble, not impressed; eyes moderate; antennæ rather short and strongly incrassate, compressed; second joint nearly as long as the next two, three to six gradually shorter, the latter slightly transverse, seven to ten gradually wider, strongly transverse, tenth on the compressed side nearly twice as wide as long, the eleventh ovoidal, obtusely pointed, longer than wide and as long as the preceding two. *Prothorax* distinctly narrower than the base of the elytra, sides in apical three-fifths parallel and rather distinctly arcuate, convergent and evenly, very feebly sinuate thence to the basal angles, which are obtuse, narrowly rounded and not at all prominent; lateral angles very broadly obtuse, rounded but rather distinct, apical nearly right, narrowly rounded; apex nearly one-half wider than the base, both subtruncate; disk scarcely one-fourth wider than long, rather finely, somewhat densely and distinctly punctate; pubescence rather long, pale fulvous; median groove rather deeply impressed and very distinct. *Elytra* quadrate, two-fifths wider and nearly one-half longer than the prothorax; sides nearly straight and almost parallel; surface densely and somewhat coarsely punctate, the punctures rather deeply impressed, separated by about their own diameters; pubescence fine, moderate in length, cinereous, rather dense and distinct. *Abdomen* slightly narrower than the elytra and much wider than the prothorax, finely, sparsely punctate, finely and more densely so beneath. Length 3.0 mm.

California (Sonoma Co.).

The unique example represents a very distinct species differing from any other which I have seen; it may, however, be placed next after *sinuatus* in the catalogue.

The hypomera are very narrow, scarcely more than one-third as wide as the distance thence to the coxæ, very feebly concave, the sutures distinct; the coxal fissures are long and very widely open. The mentum has a large, moderately deep median impression; it is shining and coarsely reticulate, the hypoglottis thin, polished, flat, not reticulate and rather long, being about one-fifth as long as the entire mentum, the dividing suture very feeble.

B. gracilis n. sp.—Slender and somewhat convex, black throughout; antennæ piceous, paler toward base and apex; legs testaceous; head feebly shining, rather coarsely, feebly granulose; pronotum strongly shining, coarsely, strongly reticulate; elytra and abdomen polished, the latter coarsely reticulate, the lines fine. *Head* rather distinctly narrower than the prothorax, rather strongly convex, not tuberculate; median fovea nearly obsolete; surface finely, sparsely and not distinctly punctate; neck transversely reticulate; antennal tuberculations small, not strong, polished at the apices; suture very feeble, not impressed; antennæ moderate, strongly incrassate; second joint much longer than the next two together, gradually, strongly incrassate from the fourth joint, tenth strongly transverse, eleventh shorter than the two preced-

ing together. *Prothorax* about one-fifth wider than long, scarcely narrower than the base of the elytra; sides in anterior two-thirds parallel and feebly arcuate, then convergent and feebly sinuate to the basal angles, which are obtuse, extremely narrowly rounded but not prominent; lateral angles very obtuse but narrowly rounded and rather distinct when viewed sublaterally, less distinct vertically, apical nearly right, slightly but distinctly rounded; apex two-fifths wider than the base, both subtruncate; disk rather strongly convex, rather finely but deeply, distinctly and not very densely punctate; pubescence sparse, moderate in length; median groove very wide, deeply excavated and extremely conspicuous. *Elytra* quadrate, one-third longer and wider than the prothorax; sides feebly arcuate toward apex; disk sparsely punctate, the punctures feebly impressed, distant by twice their own diameters and about as sparse as those of the pronotum; pubescence fine, rather long and sparse. *Abdomen* very slightly narrower than the elytra and very much wider than the prothorax, finely, sparsely punctate, somewhat coarsely and sparsely so beneath. Length 2.5–3.0 mm.

California (Mendocino, Sonoma, and Santa Cruz Cos.).

This species is allied only to *gentilis*, which it somewhat strongly resembles in external form, color and lustre. It is, however, a rather smaller species, with much sparser elytral punctuation, and much deeper and wider median groove of the pronotum. The mentum is not impressed in the middle as in *gentilis*.

The hypomera are nearly one-half as wide as the distance thence to the coxæ and are flat, except externally and posteriorly near the lateral margin, where they are narrowly impressed; the sutures are distinct, and the coxal fissures long and widely open.

B. stabilis n. sp.—Rather robust and depressed, widest at the elytra, black; elytra dark rufo-piceous to piceous-black; legs, and antennæ toward base pale flavo-testaceous, the latter infusate toward apex; head and pronotum feebly shining, densely and somewhat coarsely granulose; abdomen polished, finely and evenly reticulate. *Head* very distinctly narrower than the prothorax; eyes large; surface feebly convex, not tuberculate, the median fovea rather large and feeble but distinct; antennal prominences feeble; suture very fine and nearly obsolete; antennæ moderate, gradually incrassate; second joint rather shorter than the next two combined, tenth fully one-half wider than long. *Prothorax* nearly as wide as the base of the elytra, fully one-third wider than long; sides in anterior two-thirds parallel and very feebly arcuate, then convergent, arcuate, feebly sinuate near the basal angles, which are obtuse, not rounded and distinct, lateral broadly rounded and not very distinct, apical right and narrowly rounded; apex one-third wider than the base, both just visibly arcuate; disk finely, sparsely punctate, the punctures rather deep and distinct; median groove fine but distinct. *Elytra* large, toward apex, one-fourth wider than the prothorax, nearly two-thirds longer; sides feebly divergent and nearly straight; surface impressed on the suture at the base, deeply,

distinctly and densely punctate, the punctures rather fine, about twice as dense as those of the pronotum, and separated by slightly more than their own diameters; pubescence fine, very short, rather dense, pale brownish-cinereous and somewhat conspicuous. *Abdomen* distinctly narrower than the elytra and wider than the prothorax, very finely and extremely sparsely punctate, somewhat coarsely and moderately densely so beneath. Length 3.5 mm.

Pennsylvania (Allegheny Co.). Dr. Hamilton.

The hypomera are about one-half as wide as the distance thence to the coxæ and are broadly, rather feebly concave, the sutures fine and distinct, the coxal fissures rather long and extremely widely open. The mentum is rather shining, broadly, feebly concave, the apex being broadly feebly emarginate.

This species belongs near *annularis*, but differs in its more shining, more sparsely and distinctly punctate, and decidedly wider and more transverse prothorax, the hind angles being more prominent, and in its larger, longer and wider elytra.

B. adustus n. sp. (Fauvel MS.)—Slender, subparallel, black; elytra piceous-black, slightly paler and testaceous along the apices; legs and antennæ dark rufo-testaceous, the femora slightly clouded toward base; head and pronotum alutaceous, finely, densely granulose; elytra and abdomen polished, the latter coarsely reticulate, the lines very fine, the reticulations not finer toward apex. *Head* very slightly narrower than the prothorax; eyes moderate; surface feebly convex, not tuberculate, the vertex with a small median impressed fovea; epistoma flat, more coarsely granulose; suture fine, not impressed; antennal prominences feeble; antennæ rather short and robust, but feebly compressed; second joint more robust and fully one-half longer than the third, four to six decreasing in length, seven to ten rather abruptly wider, transverse, the latter two-thirds wider than long, eleventh ovoidal, slightly longer than wide. *Prothorax* very slightly narrower than the base of the elytra, scarcely one-fourth wider than long; sides in anterior three-fifths parallel and distinctly arcuate, thence convergent and just visibly sinuate to the basal angles, which are obtuse but not rounded, and not prominent; lateral angles rounded, apical slightly obtuse, scarcely perceptibly rounded; apex feebly arcuate, two-fifths wider than the base, the latter subtruncate: disk rather convex, not very coarsely but rather sparsely and very indistinctly punctate, the punctures feebly impressed; median groove impressed, distinct. *Elytra* quadrate, one-third wider and nearly one-half longer than the prothorax, scarcely perceptibly wider toward apex; sides very feebly arcuate; disk rather convex, not impressed in the middle at base, rather coarsely, feebly and not very densely punctate, the pubescence fine, moderate in length. *Abdomen* slightly narrower than the elytra and wider than the prothorax, very finely, sparsely punctate, more densely so beneath. Length 3.0 mm.

Colorado (Garland). Mr. E. A. Schwarz.

A small species, closely allied to *ruficornis* Lec., but differing in its sparser punctuation and rather shorter, more robust antennæ. The hypomera are feebly concave, two-fifths as wide as the distance thence to the coxæ, the sutures fine but distinct. The coxal fissures are long and very widely open.

B. languidus n. sp.—Slender, subparallel, black; elytra piceous black; legs throughout testaceous; antennæ black, two basal joints paler; head and pronotum feebly shining, rather coarsely granulose; elytra and abdomen polished, the latter rather coarsely reticulate, more strongly so toward base, not more finely toward apex. *Head* quite distinctly narrower than the prothorax; eyes moderate; surface scarcely perceptibly convex, neither tuberculate nor foveate; antennal prominences feeble; epistomal suture very fine, not impressed; antennæ rather short; second joint more robust, nearly as long as the next two together, three to six subequal in width, decreasing in length, the latter transverse and about one-half as long as the former, seven to ten strongly transverse, the former not very abruptly wider than the sixth, the latter nearly twice as wide as long. *Prothorax* very slightly narrower than the base of the elytra, one-third wider than long; sides in apical three-fifths parallel and feebly arcuate, thence broadly rounded, convergent and feebly arcuate to the basal angles, which are obtuse, not appreciably rounded and very feebly prominent; lateral angles obsolete, apical nearly right and extremely narrowly rounded; apex very feebly arcuate, one-third wider than the base, the latter truncate; disk rather finely and sparsely punctate; median groove very fine but deep and distinct; pubescence long, sparse and flavate. *Elytra* nearly as long as wide, one-fourth wider and one-half longer than the prothorax; sides feebly arcuate toward apex; disk not impressed at base, somewhat coarsely and feebly punctate; punctures impressed, distant by rather more than their own widths; pubescence cinereous, rather short, fine and sparse. *Abdomen* slightly narrower than the elytra, finely, very sparsely punctate, very finely sparsely punctate beneath. Length 3.8 mm.

Oregon (Huntington). Mr. H. F. Wickham.

This is a rather slender species, allied to *ruficornis* Lec., but distinguished by its very much sparser pronotal punctuation, black antennæ, and less opaque lustre.

The hypomera are very narrow, distinctly less than one-half as wide as the distance thence to the coxæ, and rather deeply concave, the sutures being feeble and not very distinct. The coxal fissures are very long and widely open. The mentum is broadly, feebly concave, coarsely reticulate, polished and furnished along the apical margin with a short flat polished non-reticulate hypoglottis, separated by a fine suture.

In *ruficornis* Lec. the abdomen beneath is much more densely

and coarsely punctate, and the hypomera are wider and almost perfectly flat, the sutures more distinct.

B. bicolor n. sp.¹—Black; prothorax, elytra and antennæ brown; legs flavate; head and pronotum very finely, densely granulate and opaque; elytra and abdomen polished, the latter reticulate. *Head* just visibly narrower than the prothorax; eyes rather large but moderately prominent, the setæ rather long; surface rather convex, finely and not distinctly punctate, not tuberculate, the median fovea very small and feeble; antennal prominences feeble; epistomal suture fine, not impressed; antennæ but feebly compressed, rather strongly incrassate; second joint much longer and more robust than the third, but not as long as the next two, three to six subequal in width, decreasing rapidly in length, the latter but slightly transverse, seven to ten gradually wider, the former not very abruptly so, the latter one-half wider than long. *Prothorax* very slightly narrower than the base of the elytra, scarcely one-third wider than long; sides in apical three-fifths parallel and nearly straight, then convergent and broadly, feebly sinuate to the basal angles, which are obtuse but not rounded and not prominent; lateral angles obtuse and rounded but rather distinct, apical nearly right and narrowly rounded; apex one-third wider than the base, both subtruncate; disk finely and rather densely punctate, the punctures being very indistinct and scarcely at all impressed, the pubescence fine, rather dense but dark and scarcely visible; the median groove very fine but distinct. *Elytra* nearly quadrate, one-third wider and one-half longer than the prothorax, very slightly wider toward apex; sides nearly straight; disk not impressed at base, densely and distinctly, but somewhat coarsely punctate, the punctures separated by distinctly less than their own diameters; pubescence fine, moderate in length and density, cinereous and distinct. *Abdomen* broad, but slightly narrower than the elytra and much wider than the prothorax, finely, not densely punctate, more strongly and somewhat densely so beneath. Length 3.3 mm.

California (Napa Co.).

A rather small inconspicuous species, allied to *ruficornis*, but well distinguished by its peculiar coloration, which is very constant throughout a series of eight specimens. It is further distinguished by its sexual characters, the anterior margin of the epistoma being perfectly devoid of tuberculation in the male. In the corresponding sex of *ruficornis* there are two remote and very small tuberculations which, however, are not at the apical angles as in *armatus*, but distinctly nearer the middle.

The hypomera are flat, except near the apex of the coxal fissures where they are feebly impressed; they are scarcely one-half as wide as the distance thence to the coxæ, the sutures being distinct. The coxal fissures are very widely open. The mentum is exceedingly feebly concave, the hypoglottis apparently obsolete.

B. parvicollis n. sp.—Very robust; head and prothorax much narrower; black throughout, legs pale flavate, the coxæ and femora toward base picescent; antennæ fuscous, paler toward base; head and pronotum opaque, extremely minutely and densely granulose; elytra and abdomen polished, the latter reticulate, the lines very fine, the reticulations strongly transverse and much smaller toward apex. *Head* rather distinctly narrower than the prothorax, very finely, not distinctly punctate; antennal prominences feeble, the epistomal suture scarcely visible, not at all impressed; vertex rather convex, not tuberculate; median fovea obsolete; antennæ rather long; second joint nearly one-half longer than the third, three to eight gradually decreasing in length and increasing in width, the latter obtrapezoidal, one half wider than long, ninth and tenth similar, slightly wider, but not shorter than the ninth, the eleventh orbicular, scarcely longer than wide, the antennæ viewed upon the compressed side. *Prothorax* nearly one-third wider than long; sides parallel and strongly arcuate, slightly convergent and straighter in basal third, the basal angles very obtuse, not at all rounded and minutely though noticeably prominent, lateral entirely obliterated, apical obtuse but not perceptibly rounded; apex transverse; base feebly arcuate; basal and lateral beaded margins distinct; disk finely, densely and somewhat indistinctly punctate, the median groove fine, impressed, obliterated near base and apex; pubescence rather dense, moderate in length and coarse but dark brownish in color and scarcely visible. *Elytra* large, quadrate, slightly dilated behind, where they are nearly one-half wider than the prothorax, fully three-fourths longer than the latter; sides feebly arcuate toward apex; humeri right, narrowly rounded; disk finely, rather deeply and very densely punctate, the punctures separated by from one and one-half to two times their own diameters; pubescence fine, short, dense, silvery and rather conspicuous. *Abdomen* slightly narrower than the elytra, fully one-third wider than the prothorax, finely, sparsely punctate; punctures denser along the apices of the segments; under surface densely, strongly punctate, densely pubescent. Length 4.5 mm.

California (Mendocino Co.).

The hypomera are not impressed along the lateral edges; they are one-half as wide as the distance thence to the coxæ; the coxal fissures are very long and widely open. The mentum is large and perfectly flat, finely, densely granulose and dull, the hypoglottis apparently rudimentary. The prosternal sutures are distinct.

The elytra are sometimes pale, indefinitely clouded toward the suture. Two specimens are decidedly more slender. This is a very distinct species, to be placed near *diagonalis*; the latter resembles it greatly in form, but has the surface of the head and pronotum much more shining, and the basal angles of the prothorax obtuse, narrowly but distinctly rounded, and not at all prominent. From *longipennis* it differs in its denser pronotal punctuation; this part in that species is, according to Mannerheim, "parce punctato."

B. honestus n. sp.—Slightly robust, subparallel, black; elytra, legs and antennæ throughout testaceous, the first very broadly and indefinitely clouded toward the suture; head and pronotum strongly shining, rather coarsely and strongly reticulate; abdomen reticulate, polished, the retal lines fine throughout. *Head* rather convex, slightly narrower than the prothorax, not tuberculate; median fovea very small and feeble, shining, with a few rather large and distinct widely-dispersed punctures; antennal tuberculations moderate, smooth; suture very fine but distinct; antennæ rather slender; second joint quite robust, nearly as long as the next two, third scarcely one-half longer than the fourth, fourth and fifth subequal, sixth slightly shorter, feebly transverse, six to ten very evenly but rapidly wider, the tenth nearly one-half wider than long, eleventh slightly shorter than the two preceding. *Prothorax* as wide as the base of the elytra, one-third wider than long; sides in anterior two-thirds parallel and nearly straight, then convergent and feebly arcuate, feebly sinuate for a short distance before the basal angles, which are very obtuse, slightly rounded and not distinctly prominent; lateral angles very broadly rounded and not distinct, apical right, very narrowly rounded; apex two-fifths wider than the base, just visibly arcuate, the latter truncate; disk not very coarsely punctate, the punctures very deep and distinctly defined, sparsely and somewhat unevenly distributed; pubescence fine, sparse and inconspicuous, the median groove rather coarse, deep and distinct. *Elytra* scarcely as long as wide, just visibly wider and about two-fifths longer than the prothorax; sides feebly divergent, nearly straight; surface feebly impressed near the base and suture, rather finely and not very densely punctate, the punctures separated by about twice their own diameters; pubescence moderate in length, fine, rather sparse. *Abdomen* just visibly narrower than the elytra, rather more coarsely and densely punctate than usual, beneath rufo-piceous, slightly more densely but rather finely punctate. Length 3.3 mm.

New York (Catskill Mts.). Mr. H. H. Smith.

The hypomera are narrow, distinctly less than one-half as wide as the intervening coxal distance, and are strongly and narrowly concave throughout the length, the sutures almost completely obsolete, the coxal fissures rather long, widely open, the prosternal surface immediately before them transversely impressed. The mentum is shining, coarsely reticulate and broadly, strongly impressed in the middle toward base, the hypoglottis membranous, and nearly one-fourth as long as the entire mentum.

The prosternal sutures being effaced, with the coxal fissures widely open, constitute of this very distinct species, one of the bonds uniting the *cordatus* and *annularis* groups of LeConte. Although the sutures are obsolete, it is easy to perceive the extent of the hypomera, as the reticulation of the surface is longitudinal on these parts, and without definite arrangement elsewhere.

Group 5.—*cordatus*.

A rather limited group containing the smallest species of the genus, polished, sometimes dull, black, with the elytra always pale, white or yellowish-white, clouded toward suture and base with brown, piceous or black:—

<i>dimidiatus</i> Lec.	<i>turbulentus</i> n. sp.
<i>basalis</i> Lec.	<i>opaculus</i> Lec.
<i>ignavus</i> n. sp.	<i>cordatus</i> Say.
<i>misellus</i> n. sp.	<i>forcipatus</i> Lec.
<i>neglectus</i> n. sp.	

B. ignavus n. sp.—Slender, rather convex, parallel, black; elytra very pale, whitish, translucent, indefinitely clouded with piceous toward suture and at the base; legs piceous, tibiae and tarsi flavate; antennae flavate, piceous toward apex; integuments polished throughout, head and prothorax very finely reticulate, the reticulations on the latter tending to a transverse arrangement; abdomen more coarsely reticulate, the lines very fine. *Head* distinctly narrower than the prothorax, very convex, neither tuberculate nor foveate, rather finely, distinctly and sparsely punctate; antennal tuberculations extremely small and feeble; epistomal suture very fine, feeble, not impressed; anterior angles of the epistoma very minutely but acutely and distinctly tuberculate; antennae rather short, gradually and very strongly incrassate; second joint robust, longer than the next two together; three to six small, sixth strongly transverse, eighth twice as wide as long, shorter than the ninth and tenth which are rather strongly transverse, eleventh ovate, scarcely longer than wide. *Prothorax* as wide as the elytra, nearly one-half wider than long; sides in apical two-thirds parallel and very nearly straight, then very broadly rounded into the base, without lateral or basal angles; base subtransverse in the middle; apex broadly evenly and just visibly arcuate; apical angles right and narrowly but distinctly rounded; disk rather strongly, evenly, transversely convex, very finely, evenly and sparsely punctate; median groove very fine but distinct, not quite attaining the apex. *Elytra* quadrate, about two-thirds longer than the prothorax; sides nearly parallel and straight; outer angles very broadly rounded, inner narrowly but distinctly so; surface not distinctly impressed near the base, rather coarsely, very feebly and somewhat densely punctate, the punctures separated by their own widths. *Abdomen* slightly narrower than the elytra; sides parallel and feebly arcuate; surface finely, sparsely punctate, beneath very minutely and sparsely punctate. Length 1.9 mm.

Rhode Island.

The hypomera are flat but depressed below the lateral edges which are, therefore, finely prominent; the coxal fissures are very short and narrowly open, the sutures obsolete. The mentum is

very short, twice as wide as long, shining but coarsely confusedly reticulate, broadly, feebly emarginate throughout the width at apex, with a narrow impressed transverse groove just behind and along the apical margin, and a small deep abrupt impression in the middle at the base, elsewhere convex and slightly tumid.

The description is taken from the male, the eighth segment having the usual acute incisure; it is very closely allied to *basalis* Lec., but differs in its smaller size, more transverse and more sparsely punctate prothorax, in which the anterior angles are less prominent, and its shorter, more coarsely and much more feebly punctate elytra, in which the exterior apical angles are more broadly rounded. In *basalis* the mentum is truncate at apex, feebly impressed in the centre, the surface on each side of the impression forming a rounded tumid elevation. It is totally devoid of the small round fovea near the base, which is so marked in *ignavus*.

B. misellus n. sp.—Rather slender, black; elytra very pale, whitish, the basal third piceous-brown, the same tint extending broadly along the middle nearly to the apex; legs and antennæ very pale, the latter infusate; femora darker; integuments polished, except the elytra reticulate, the abdomen coarsely so, the lines very fine, the pronotum more finely so, with the reticulations tending to a transverse arrangement. *Head* rather distinctly narrower than the prothorax, strongly convex, neither tuberculate nor foveate, rather finely but distinctly and sparsely punctate; antennal prominences very small and extremely feeble; suture fine, not impressed; eyes moderate, very coarsely faceted, not very prominent; antennæ short, robust, gradually and strongly incrassate, rather strongly compressed; scape as long as the next six joints combined; second joint much longer than the next two, all the joints after the third transverse, successively more strongly so, compactly placed, the eleventh short, very broad, not as long as wide, very obtuse. *Prothorax* nearly as wide as the base of the elytra, nearly two-fifths wider than long; sides in apical three-fourths parallel and nearly straight, then abruptly, broadly rounded into the base without lateral or basal angles; base transverse; apex truncate, the apical angles acute and slightly anteriorly prominent, feebly rounded externally; disk transversely, rather strongly convex, very finely though distinctly, sparsely punctate, the median groove very fine, rather feebly impressed and not quite attaining the apex. *Elytra* slightly longer than wide, two-fifths wider and fully four-fifths longer than the prothorax; sides just visibly divergent, nearly straight; exterior apical angles very broadly rounded, interior extremely narrowly so; surface feebly impressed near the suture toward base, very finely, feebly, not very distinctly punctate, the punctures generally separated by between two and three times their own diameters; pubescence extremely short, sparse and inconspicuous. *Abdomen* distinctly narrower and scarcely longer than the elytra; sides very feebly convergent

from base to apex and very feebly arcuate, very minutely and sparsely punctate, beneath minutely, very sparsely punctate, the pubescence longer and more distinct. Length 1.8 mm.

Texas (Galveston).

The hypomera are feebly impressed along the sides and are rather wide, the sutures obliterated, the coxal fissures short, almost completely closed. The mentum is short, fully twice as wide as long, broadly, feebly emarginate at apex throughout the width, deeply and coarsely foveate in the middle near the base, the surface distinctly tumid on either side of the fovea, and having a few coarse setigerous punctures.

Although to be classed with *basalis*, this little species, one of the smallest known in our fauna, is not very closely allied to it. The elytra are relatively larger and longer, and are much more finely punctate. The sides of the prothorax are straight in apical three-fourths, while in *basalis* the parallel portion of the sides is much shorter. The series before me exhibits great variation in the extent of the brownish-piceous tint, this being confined in one specimen to the basal margin.

B. neglectus n. sp.—Slender, black; elytra very thin and translucent, whitish, the suture and base blackish; legs and antennæ testaceous, the latter infusate, the femora darker; head and pronotum very finely, densely and evenly granulate-reticulate, rather feebly shining; abdomen polished, coarsely reticulate, the lines fine. *Head* much narrower than the prothorax, convex, neither foveate nor tuberculate, finely, rather feebly and sparsely punctate, the median portions impunctate; antennal prominences very small and feeble; eyes moderate; epistomal suture fine; epistoma with a fine distinct tubercle on the apical edge near each anterior angle; antennæ moderate, rather strongly compressed, gradually and strongly incrassate; second joint slightly longer than the next two together, fifth quadrate, rather longer than either the fourth or sixth, six to ten wider than long, the latter by three-fourths its length, eleventh very slightly wider than long, very obtuse; joints throughout not very compactly joined. *Prothorax* nearly as wide as the base of the elytra, two-fifths wider than long; sides in anterior three-fourths parallel and straight, then very strongly convergent and broadly, feebly but distinctly sinuate to the basal angles, which are obtuse and rounded but rather distinct, lateral more broadly rounded and less distinct, apical right, very narrowly rounded, not at all prominent; base and apex transversely truncate; disk transversely, moderately convex, rather finely, feebly and densely punctate; punctures separated by nearly twice their own widths; median groove very fine but distinct. *Elytra* quadrate, two-thirds longer and one-third wider than the prothorax; sides nearly straight, feebly divergent; surface distinctly impressed near the suture at base, finely, rather feebly and densely punctate; pubescence extremely

short. *Abdomen* distinctly narrower than the elytra; sides parallel and nearly straight, a little more convergent toward apex; surface very finely, sparsely punctate, beneath minutely and sparsely so. Length 2.5 mm.

Rhode Island.

The hypomera are very wide, with the sides parallel, flat but depressed far below the lateral edges, so that the latter are very acute and prominent; the coxal fissures are extremely short and appear to be very narrowly open, the hypomeral edge being beneath the prosternal or anterior edge. The mentum is nearly flat, the subbasal median impression being somewhat feeble.

This species belongs in the neighborhood of *basalis*, but differs in the form of the prothorax and sinuation of the convergent portion of the sides, and in its rather distinct basal angles; the elytra are more finely and densely punctate and the size considerably larger.

B. turbulentus n. sp.—Rather slender, black; elytra very pale, yellowish-white, the basal margin piceous-black; legs and antennae testaceous, the femora darker; integuments polished, head and prothorax finely, evenly and rather strongly reticulate; abdomen coarsely reticulate, with the retal lines very fine. *Head* distinctly narrower than the prothorax, convex; eyes rather large and prominent; surface finely, rather feebly and sparsely punctate, neither foveate nor tuberculate; antennal prominences small and very feeble; suture fine, not impressed; epistoma with a fine apical tubercle near each anterior angle; antennae rather slender, evenly incrassate; second joint not very robust, cylindrical, slightly longer than the next two together, fifth distinctly longer than wide, eighth and ninth similar in form, the latter the larger, just visibly wider than long, tenth slightly shorter than the ninth, less than one-half wider than long, eleventh not quite as wide as the tenth, distinctly elongate, gradually pointed, as long as the seventh and eighth together. *Prothorax* nearly as wide as the base of the elytra, two-fifths wider than long; sides in anterior two-thirds parallel and straight, then convergent and very feebly arcuate to the basal angles, which are very obtuse and broadly rounded and not distinct; lateral angles very obtuse and broadly rounded, apical right, not visibly rounded and just perceptibly anteriorly prominent; apex transversely truncate; base very feebly arcuate; disk transversely, moderately convex, finely punctate, the punctures rather feebly impressed and somewhat dense, being separated by scarcely more than twice their own diameters; median groove very fine, feebly impressed, not attaining the apex. *Elytra* quadrate, two-thirds longer and one-fourth wider than the prothorax; sides nearly straight, just visibly divergent; outer angles rather broadly, inner very narrowly rounded; surface feebly impressed near the suture at base, finely, feebly and densely punctate. *Abdomen* distinctly narrower than the elytra, as wide as the prothorax; sides parallel and nearly straight, the sixth

segment distinctly narrower from base to apex; surface finely, sparsely and unevenly punctate, beneath rather densely so, especially toward base. Length 3.0 mm.

Florida. Mr. E. A. Schwarz.

This species was confounded by LeConte with *basalis*, from which it differs in many conspicuous characters, and chiefly in its much longer, more slender antennæ, these in *basalis* being very short, the outer joints very strongly transverse and more compactly connected, the eleventh very short, obtuse and much wider than long, the fifth wider than long; it also differs in its much more finely and densely punctate elytra, and in its decidedly greater size. *Basalis* is quite uniform in size, the series of six specimens before me offering but slight variation in this respect, the length being 2.0–2.2 mm., and not as great even as the minimum length (2.5 mm.) given by Dr. LeConte in the original description. The present description is taken from the male, and it has been compared with the same sex of *basalis*.

The structure of the under surface of the prothorax is nearly as in *basalis*, the coxal fissures being very short and entirely closed. The mentum is flat, with a large deep impression in the middle near the base.

NOTE.

In the list of Staphylinidæ published since the date of the Munich Catalogue, recently compiled by M. Ant. Duvivier, appears the name *Bledius LeContei* Duviv., for *B. phytosinus* Lec., under the supposition that the latter name was pre-occupied, but as LeConte's name was published in 1877, and *phytosinus* Fauvel not until 1878 (l. c. p. 101), it is evidently the latter which should fall and not *phytosinus* Lec. The name *Bledius LeContei* has recently been given by Dr. Sharp to a Mexican species (Biol. Cent.-Amer., Coleop. I, Pt. 2, p. 685). The Fauvelian species must be considered therefore as still unnamed.

APLODERUS Steph.

Haploderus Lac., Lec., etc.—*Phleconæus* Er., Lec.

The species of *Aploderus*¹ are comparatively few in number and

¹ The alteration of the original name *Aploderus* as published by Stephens, to *Haploderus*, is unwarranted by any rule of nomenclature based upon solid reason. To legitimize the changing of a name once given by an author, even by the purists, is to open the way to unending confusion, and should not be encouraged. The sense of the majority of modern authors seems to favor, or

somewhat resemble *Trogophlæus* in external facies. They are at once distinguishable, however, by the extremely large, externally angulate and open anterior coxal cavities, the open portion beyond the coxæ having a large trochantin or plate, which probably serves the purpose of an operculum; they also differ by having a row of short rather robust and distinct spinules along the outer edge of the anterior tibiæ. The genus is rather closely related to *Ancyrophorus*, the latter being distinguished by the visible scutellum and rather longer and more conical fourth joint of the maxillary palpi. The affinity with *Oxytelus* is much more remote, not only in habitus, but in the special modifications of structure.

The eighth ventral segment of the males, as usual in this portion of the *Oxytelini*, is longitudinally divided throughout its length, forming two distinct parts which overlap. In the present genus the overlapping edge is parallel to the axis of the body, and the

at least tolerate, the adoption for generic names of any combination of letters which is moderate in length, easily pronounceable, and which has a Latin form or habitus so to speak, and although *Aploderus* may not be as good Greek as *Haploderus*, it is at all events a certain definite combination of letters, having a Latin form, and easily pronounceable, and could not be altered even by the author himself.

Although generic names are generally taken or derived from the Greek, they cease to be Greek and become Latin as soon as published over a description, and *Aploderus* is as good a Latin word as *Haploderus*, or *Bledius*, or *Hamletia*. The only reason for altering a name once published is because of a typographical error which may either delatinize it, or render it unpronounceable.

If generic names be not considered as Latin simply and solely, we are continually guilty of a "barbarism" of the worst kind—the modification of a Greek word by a Latin adjective. It being granted therefore that generic words are Latin and not Greek, it follows that the gender of specific names should depend upon the ending of the generic name in its Latin sense, i. e., words ending in *a*, *is*, and *e* are feminine, e. g. *Tygloderma æren* and not *æreum*. Unfortunately there are many words used for genera which are perfectly Greek in form and not Latin; in these cases the only course to pursue is to give to the specific names genders which coincide with the Latin equivalent, e. g., *Medon fuscum* and not *fuscus*.

The reason given by LeConte for the suppression of *Aploderus* and the substitution therefor of *Phlæonæus* Erichs., is not, in the opinion of the writer, a valid one. As long as a certain definite described species is stated by an author to be the type of a genus, the genus must be considered established, even though not described.

apex is therefore never deeply angularly incised, as would be the case when the two edges are oblique, as in *Bledius*.

In the table and descriptions given below, the specific characters throughout are drawn from the male only.

The species belonging to our fauna, although as far as known only five in number, are easily divisible into two distinct groups as follows:—

Anterior coxal cavities extremely large, angulate, extending to within a short distance of the lateral edges of the prothorax, this distance being not greater than the distance separating them from the anterior margin of the prosternum.....**I**

Head and prothorax narrower than the elytra; eyes moderate, the tempora behind them equally prominent and but slightly longer.....**linearis**

Head and prothorax as wide as the elytra; form parallel; eyes very small, the tempora behind them nearly three times as long, strongly arcuate and much more prominent.....**cephalotes**

Anterior coxal cavities smaller and shorter, broadly triangular, the hypomera wide, the distance separating the cavities from the lateral margin of the prothorax much greater than their distance from the anterior margin of the prosternum.....**II**

Head equal in width to the prothorax or extremely nearly so; basal joint of the antennæ subequal in length to the next three together; elytra distinctly less than twice as long as the prothorax.

Antennæ much longer than the head and prothorax together; sides of the abdomen straight and feebly divergent from base to apex....**princeps**

Antennæ about equal in length to the head and prothorax, the joints more compactly joined and more transverse; sides of the abdomen parallel and evenly, distinctly arcuate throughout.....**flavipennis**

Head slightly, although distinctly, narrower than the prothorax; basal joint of the antennæ shorter, subequal in length to the next two together; elytra about twice as long as the prothorax; sides of the abdomen parallel and straight.....**annectens**

A. linearis Lec.—*Haploderus lin.* Lec., Smith. 8vo., n. sp. Col., p. 54.—Slender, black; elytra and sometimes prothorax paler, dark piceous-brown; polished; pubescence very short, extremely sparse. *Head* equal in width to the prothorax; eyes moderate, nearly equal in length to, and rather more convex than the tempora behind them, the latter as prominent as the eye; antennæ rather slender, geniculate, the basal joint as long as the next three, second scarcely visibly longer than the third, oval, the latter strongly obconical, tenth joint very slightly wider than long. *Prothorax* nearly three-fourths wider than long; sides strongly arcuate anteriorly, feebly convergent and straight toward base, the base and apex broadly arcuate; basal angles rounded; disk very sparsely, deeply punctate, with a broad median impunctate line, on either side of which there is a narrow, feeble and rather indefinite

longitudinal impression. *Elytra* quadrate, one-third wider and about three-fourths longer than the prothorax, densely, very deeply and somewhat coarsely punctate. *Abdomen* narrow, much narrower than the elytra; sides straight and parallel; surface extremely minutely and sparsely punctate.

Male.—Sixth ventral segment with a very large median area, which is flattened and finely densely pubescent; seventh broadly, feebly emarginate throughout the width at apex, the middle of the emargination feebly produced in a short rounded process.

Female.—Sixth segment not densely pubescent; seventh not emarginate, longer, the middle of the apex produced in a rather long process—about twice as wide as long—which is strongly arcuate.

Length 2.7–3.0 mm.

California; Oregon; British Columbia.

An extremely common species, easily separated from the next by its relatively longer and wider elytra and many other characters.

A. cephalotes n. sp.—Rather slender, parallel, piceous-black; pronotum rufous; elytra paler, flavescent; legs pale flavate; antennæ piceous-black throughout; integuments polished; pubescence very short and sparse. *Head* large, orbicular, slightly wider than long, as wide as the prothorax, feebly convex; transverse basal line finely, feebly impressed; surface finely, feebly, very sparsely punctate, with a short fine very feeble canaliculation in the middle nearly attaining the transverse groove; antennal prominences short, rather wide and rather strongly elevated; oyes very small, feebly convex, the sides behind them almost three times as long, strongly arcuate and much more prominent; antennæ fully as long as the head and prothorax together, feebly incrassate, second and third joints subequal, tenth rather distinctly transverse. *Prothorax* nearly twice as wide as long; sides more strongly arcuate anteriorly, strongly convergent and feebly arcuate toward base, the latter broadly, distinctly arcuate, the basal angles very broadly rounded, apical acute, not at all rounded, and slightly anteriorly prominent; apex truncate; disk not distinctly impressed, not very coarsely or deeply, very sparsely and unevenly punctate, a broad median line impunctate. *Elytra* quadrate with the sides parallel, equal in width to the prothorax and one-half longer, coarsely, very deeply and densely punctate, a narrow line on each, near the suture rather deeply impressed. *Abdomen* nearly as wide as the elytra; sides parallel and very slightly arcuate; surface very minutely, sparsely punctate.

Male.—Sixth ventral segment with a very large median area which is distinctly flattened, and covered very densely with fine erect pubescence; seventh broadly, feebly emarginate throughout its width, the middle of the emargination not in the least produced; eighth with a narrow elongate impression.

Female.—Unknown.

Length 3.0 mm.

California (San Francisco).

This is a remarkable species, its slightly transverse orbicular

head, with very small eyes, and long strongly arcuate tempora, its parallel forin and relatively smaller, very coarsely punctate elytra, at once distinguishing it from any other.

A. princeps n. sp.—Rather convex, parallel, pale flavate throughout; head slightly darker, fuscous; antennæ feebly infuscate toward apex; integuments polished; pubescence sparse but rather long and distinct. *Head* fully as wide as the prothorax, rather strongly and densely punctate except in the middle and anteriorly; punctures moderate; median post-vertical impression feeble; nuchal constriction very strong; eyes moderate, slightly prominent, the tempora nearly twice as long, strongly arcuate and a little more prominent; antennæ rather slender, feebly incrassate, distinctly longer than the head and prothorax; basal joint subequal in length to the next three, second very slightly longer than the third, sixth fully as long as wide, tenth rather longer than wide and wider than long on the uncompressed and compressed sides respectively. *Prothorax* three-fifths wider than long; sides broadly, obtusely subangulate at anterior third, thence distinctly convergent and nearly straight to the broadly rounded basal angles; base broadly subtransverse; apex very broadly, feebly arcuate; apical angles slightly obtuse and scarcely perceptibly rounded, not at all prominent; disk strongly, arcuately impressed on each side of the median impunctate area, the impressions abruptly reflexed and continuing anteriorly nearer the sides, inclosing an impunctate callus; elsewhere rather strongly and densely punctate. *Elytra* about two-fifths wider and two-thirds longer than the prothorax, not quite as long as wide, strongly impressed along the suture toward base; disk rather depressed, rather coarsely, deeply and densely punctate, the punctures generally separated by a little less than their own diameters. *Abdomen* just visibly increasing in width from base to apex, slightly narrower than the elytra; sides straight; surface very finely, sparsely punctate, just perceptibly clouded with fuscous toward apex, the latter again paler.

Male.—Sixth segment very broadly arcuately emarginate throughout its width, the edge in middle third fimbriate with a line of excessively short and minute pointed membranous hairs, the surface with two diverging tufts of long setæ, the intermediate broadly triangular apical portion scarcely impressed but devoid of pubescence. Seventh segment broadly, angularly emarginate, the surface having in middle two-fifths a transverse strongly and posteriorly angulate line of densely placed obliquely inclined spinose setæ, the anterior inclosed surface feebly impressed and devoid of pubescence; surface laterally, beyond the line of setæ, having numerous very long stiff bristles. Eighth segment nearly normal, not impressed.

Female.—Unknown.

Length 4.4 mm.

Nevada.

In its wonderfully distinct sexual characters, large size, pale coloration and longer pubescence, especially of the pronotum, this

is by far the most remarkable species of this section of the genus. There are but two specimens known, and the male above described I owe to the kindness of Mr. C. H. Roberts, of New York.

A. flavipennis n. sp.—Somewhat robust, but moderately depressed; head black; pronotum dark rufo-piceous; elytra pale flavate; abdomen piceous throughout; legs pale flavate; antennæ piceous-black, the basal joint very dark rufo-testaceous; integuments polished, very finely and extremely sparsely pubescent. *Head* as wide as the prothorax; eyes rather small, somewhat convex, the tempora about three-fourths longer, less strongly arcuate but rather more prominent; transverse basal impression distinct; surface feebly convex, finely but distinctly and rather densely punctate, a wide median area impunctate; antennal prominences strong but small and very short; antennæ rather slender, very feebly incrassate, as long as the head and prothorax, basal joint about equal in length to the next three together, second scarcely visibly longer than the third, tenth very slightly longer than wide. *Prothorax* fully three-fourths wider than long; sides near the apex broadly subangulate, the angle narrowly rounded, thence feebly convergent and nearly straight to the apex, slightly more strongly so and very feebly arcuate to the basal angles which are rounded; base subtruncate toward the middle; apex broadly and distinctly arcuate, very feebly sinuate near each angle, the latter very slightly obtuse, very narrowly rounded, not prominent; disk strongly impressed in the middle at each side of the impunctate median line, the impression reflexed posteriorly and extending thence anteriorly nearer the sides, becoming broader and feebler and not attaining the apex; intermediate callus smooth, impunctate; impressed areas finely, rather densely punctate. *Elytra* slightly wider than long, one-third wider and nearly three-fourths longer than the prothorax; sides nearly parallel and straight; surface with a strong elongate impression at each side of the suture at base, rather finely deeply and densely punctate. *Abdomen* rather distinctly narrower than the elytra; sides parallel and very distinctly arcuate; surface very minutely and extremely sparsely punctate; under surface more densely so and with rather long cinereous and conspicuous pubescence.

Male.—Sixth ventral segment with a very small narrow elongate-oval area, not attaining the apex, which is more densely and finely pubescent; seventh very broadly, feebly emarginate throughout its apical width, the middle of the emargination transverse; eighth flattened but not impressed.

Female.—Seventh segment very broadly arcuate, the median portion with a fringe of very fine porrected membranous hairs; eighth broadly impressed.

Length 3.4 mm.

California (Mendocino, Santa Clara and Monterey Cos.).

The specimens before me consist of a single representative from each of the above localities—one male and two females. The species differs from *annectens*, not only in the characters given in the table, but in its shorter and rather more coarsely punctate elytra, and in the sexual characters of the female.

In the male type above described, there is a stout spinose seta at the posterior extremity of the pubescent area of the sixth segment; I cannot determine whether this is accidental or not.¹

A. annectens Lec.—*Ancyrophorus annert.* Lec., Trans. Am. Ent. Soc., VI, p. 242.—Slightly robust, strongly depressed, piceous-black; elytra paler, rufo-piceous; legs pale flavate; antennæ piceous-black, fuscous toward base; pubescence extremely fine and sparse, much less sparse on the elytra; integuments polished. *Head* rather distinctly narrower than the prothorax, feebly convex, feebly and sparsely punctate, a wide median area impunctate; eyes moderate, rather convex, the tempora one-half longer and a little less convex than the eye, although equally prominent; transverse basal impression strong; vertex not impressed in the middle; antennæ long, evenly and rather distinctly incrassate, a little longer than the head and prothorax together, strongly geniculate, basal joint about as long as the next two together, the latter subequal, tenth nearly as long as wide. *Prothorax* three-fourths wider than long, transversely truncate at base and apex; sides obtusely angulate near the apex, convergent and nearly straight to the apex and base; basal angles distinctly rounded, apical nearly right and just visibly rounded, not anteriorly prominent; disk broadly, rather feebly, somewhat indefinitely and arcuately impressed on each side of the rather narrow median impunctate line, the latter wider near the apex; punctures moderate, somewhat dense in the impressed areas. *Elytra* one-third wider than, and nearly twice as long as the prothorax, quadrate, depressed, broadly impressed in the middle at base, rather finely distinctly and densely punctate. *Abdomen* distinctly narrower than the elytra; sides straight and parallel.

Male.—Sixth segment normal, without trace of denser pubescence in the middle; seventh extremely broadly and feebly emarginate at apex, the middle of the emargination just visibly produced and arcuate; eighth not impressed.

Female.—Seventh segment longer, broadly rounded at apex, the middle of the apex with a very feeble sinuation, the margin of the sinuation lined with a fringe of short, porrected, semi-membranous or gelatinous hairs; eighth impressed.

Length 3.5 mm.

California (Sonoma Co.).

A wider, more depressed species than the preceding, and apparently somewhat rare. The series before me consists of five specimens, all taken at Fisk's Mill on the seacoast.

¹ Since writing this paragraph I have received one other male example from Alameda Co. The spine is very distinct and in the same position, but instead of a single spine, there is here a closely condensed clump of five or six stiff setæ. The appearance of a single stiff spine in the original type is probably due to the complete agglutination of these setæ. The head in the Alameda male is, however, quite distinctly narrower, and this particular specimen may possibly be less fully developed.

THINOBIUS Kies.

This genus, although allied somewhat to *Trogophlœus*, differs in three very important structural characters, viz: the visible scutellum, broadly rounded inner apical angles of the elytra, and antennal structure, the fourth and sixth joints of the latter being invariably smaller than the fifth and seventh. These differential characters are very constant throughout our species, and there are no others which I have observed of sufficient importance to warrant the creation of a new genus. There are, however, certain characters possibly of subgeneric value, which should at least be noted.

In group I, the pubescence of the elytra is of dual composition. The very densely placed punctures bear, each, a very minute recumbent and scarcely visible seta, sometimes quite robust, and which constitutes the principal part of the vestiture, but, in addition, there is a system of longer erect and much more sparsely distributed hairs. In the other two groups here indicated, there is no sign of this complexity, and the pubescence is uniform throughout, consisting of fine erect or suberect hairs, all of equal length. It should also be stated that in groups I and II, the sixth abdominal segment is equal in length to the fifth, while in group III it is very much longer.

The European species are divided by Rey into sections which are considered of generic value. The species here noted under group I, seem to be entirely congeneric with the true *Thinobius* of Rey (*Hist. Nat. Col. Fr., Oxyt.*), but the *Thinophilus* of that author is almost certainly not represented in our fauna, at least there is no species known to us at present, which possesses the cephalic structure indicated as a prominent character of that genus (*l. c.* Plate VI), and should our groups be considered of subgeneric value, as they might with possible propriety in a general monograph, they must receive new names.

The species are probably numerous, but owing to their very minute size they have been almost totally neglected by our collectors. Those at present known to me may be identified by the following characters:—

Antennæ moderate in length, scarcely ever much longer than the head and prothorax, with the outer joints robust, the last ovoidal; integuments very minutely and densely punctate, or punctato-rugulose and dull
Antennæ flavate.

Elytra twice as long as the prothorax, or very nearly so.

Pronotum distinctly, broadly impressed laterally.....**oxytelinus**

Pronotum not impressed laterally.....**pallidicornis**

Elytra not more than one-half longer than the prothorax.

Castaneous; elytra together distinctly wider than long...**flavicornis**

Black, elytra quadrate.....**grossulus**

Antennæ black or piceous-black.

Pronotum not perceptibly impressed.

Integuments more coarsely and strongly granulose, the short appressed pubescence bright fulvous in color.....**macropterus**

Integuments much smoother, not granulose but excessively minutely and densely punctate, the punctures all distinct, the pubescence dark cinereous and not at all conspicuous**sonomæ**

Pronotum with two small, feeble but distinct impressions near the basal margin.

Castaneous or piceous, the punctures granulose and subconfluent.

Form rather robust**fimbriatus**

Form slender**hesperius**

Black, the punctures not quite so dense, and the lustre more shining.

pygmæus

Antennæ very long and slender, outer joints elongate, the eleventh elongate, and subcylindrical; integuments very minutely, densely punctate; lustre alutaceous **II**

Size large, 1.7 mm.; elytra very short, one-fourth longer than the prothorax**antennarius**

Size smaller, not exceeding 1.5 mm.

Pale brown; antennæ pale flavate.....**pallidus**

Black; antennæ piceous-black**gracilicornis**

Antennæ very short and robust; integuments shining, coarsely and more sparsely punctate **III**

Pale brownish-flavate, very slender; punctures finer; pronotum strongly impressed along the lateral edges; antennal joints very strongly transverse**crassicornis**

Black, more robust; punctures much coarser and relatively denser; pronotum not impressed along the sides; antennal joints very feebly transverse.....**validus**

T. oxytelinus Lec.—Trans. Am. Ent. Soc., VI, p. 240.—Rather robust and depressed, castaneous; abdomen piceous; legs and antennæ pale flavate; integuments dull. Head almost as long as wide, feebly convex, very minutely and densely punctate, the punctures distinct and just visibly separated, the interspaces slightly shining; tuberculations moderate in size, feeble; eyes moderate, rather convex and prominent, very coarsely faceted, the sides behind them distinctly convergent to the neck, and very short; antennæ a little longer than the head and prothorax, rather slender, distinctly clavate, second joint cylindrical, more than twice as long as wide and fully as long as the next two, third distinctly longer than wide, fourth just visibly longer than wide,

slightly longer than the sixth and distinctly shorter than the fifth, the latter scarcely more robust, outer joints scarcely wider than long, the eleventh robust, ovoidal, rather abruptly pointed, one-half longer than wide. *Prothorax* nearly one-fifth wider than the head, three-fifths wider than long; sides parallel, evenly and distinctly arcuate; base broadly, feebly arcuate, angles broadly rounded; apex truncate, angles obtuse and narrowly rounded; disk feebly convex, broadly, distinctly impressed laterally and anteriorly, also with very faint traces of two small basal impressions which trisect the width; surface punctured like the head. *Elytra* nearly one-fourth wider than the prothorax and about twice as long, very depressed; sides just visibly divergent from base to apex and very slightly arcuate; surface excessively minutely and densely granulate, the recumbent pubescence not distinctly visible, the longer erect hairs rather distinct, not dense. *Abdomen* very slightly narrower than the elytra, short; sides nearly parallel; border narrow, deep; surface more coarsely, sparsely punctate and slightly shining. Length 1.0 mm.

California (Oak Grove 1). Mr. G. R. Crotch. Cab. LeConte.

In the type-specimen there is not the slightest trace of an impressed dorsal channel on the pronotum, and the record of one by LeConte is an inadvertence. The elytra are distinctly paler, rufescent, and practically uniform throughout the surface, the duskiness of the base and margins spoken of in the original description being not clearly evident. This is a very distinct species.

T. pallidicornis n. sp.—Rather slender, piceous-black; femora dark piceous-brown, tibiae, tarsi and antennae throughout paler, brownish-flavate; integuments dull. *Head* fully as long as wide, very minutely, strongly and densely granulose, the punctures not distinct; tuberculations very small and feeble; suture very fine, shining; eyes moderate, feebly convex, the tempora about as prominent, parallel, feebly arcuate and more than one-half as long; antennae about as long as the head and prothorax, slightly robust, rather feebly clavate, second joint about as long as the next two together, fourth and sixth subequal, smaller than the fifth and very slightly wider than long, outer joints slightly transverse, eleventh ovoidal, abruptly pointed, scarcely more than one-third longer than wide. *Prothorax* slightly wider than the head, three-fourths wider than long; sides parallel and distinctly arcuate; basal angles obsolete, very broadly rounded into the base, the latter in the middle more feebly arcuate; apex truncate; apical angles slightly obtuse and not distinctly rounded; disk with very faint traces of two parallel impressions, feebly convex, obsoletely tumid along the middle toward base, extremely minutely and densely punctate. *Elytra* parallel, one-fourth wider and four-fifths longer than the prothorax, excessively minutely and densely, and rather strongly punctato-granulose, the longer suberect hairs very minute and rather sparse. *Abdomen* slightly narrower than the elytra, decidedly narrowed toward apex; border rather thin, moderate in depth; surface feebly

convex, very finely and rather more sparsely punctate and less dull, the sixth segment shining and with a transverse row of erect discal setæ. *Legs* moderate. Length 0.8 mm.

Texas (Austin 1).

Very easily distinguishable by its small size, piceous-black color, with pale antennæ, and more strongly granulose integuments.

T. flavicornis Lec.—Trans. Am. Ent. Soc., VI, p. 240.—Rather slender, somewhat pale, castaneous; abdomen piceous-black; legs and antennæ throughout pale flavate; integuments alutaceous. *Head* nearly as long as wide, very feebly convex, excessively minutely and very densely punctate: tuberculations very small, rather feeble, widely distant; suture distinct; antennæ as long as the head and prothorax, rather robust, very feebly incrassate, second joint scarcely twice as long as wide and barely as long as the next two together, third decidedly longer than wide, fourth and sixth quadrate and but slightly smaller than the fifth, outer joints just visibly transverse, eleventh ovoidal, gradually pointed, three-fourths longer than wide; eyes moderate, feebly convex. *Prothorax* very slightly wider than the head, slightly less than one-half wider than long; sides parallel and very feebly arcuate; base transversely, strongly arcuate, angles very broadly rounded; apex very feebly, broadly sinuate, angles not distinctly rounded; disk very feebly, evenly convex, punctured like the head and without trace of impressions. *Elytra* parallel, a little wider than long, just visibly wider and one-third longer than the prothorax, depressed, excessively densely punctato-granulose, the sculpture being decidedly finer and denser than that of the prothorax, the recumbent pubescence excessively fine and not distinct, the erect sparser hairs distinct. *Abdomen* short, fully as wide as the elytra; sides parallel, straight; border narrow, moderate in depth; surface more coarsely punctato-reticulate, the sixth dorsal broadly, feebly sinuate in the middle. *Legs* robust. Length 0.9 mm.

New York (Coney Island). Cab. LeConte.

The paler color, larger, relatively longer prothorax, and decidedly shorter elytra, will serve to separate this species from any other of the present section of the genus. The antennæ are just perceptibly darker toward tip, and the abdominal punctuation is quite coarse, somewhat dense and very distinct.

T. grossulus n. sp.—Rather slender, parallel, piceous-black, the anterior portions with a very feeble castaneous tinge; legs and antennæ flavate; integuments dull. *Head* fully as long as wide, very feebly convex, very minutely and densely punctate, the punctures not absolutely in contact; tuberculations very feeble; eyes moderate, feebly convex, the sides behind them feebly convergent to the neck; antennæ as long as the head and prothorax, rather feebly incrassate, second joint fully as long as the next two, more than twice as long as wide, third distinctly longer than wide, fourth and sixth subequal, very slightly transverse, fifth more robust, slightly longer

than wide, seventh slightly longer and thicker than the eighth, outer joints rather longer than wide, the eleventh ovoidal, gradually pointed, twice as long as wide. *Prothorax* slightly but distinctly wider than the head, one-half wider than long; sides parallel, evenly and rather strongly arcuate; base broadly, more feebly arcuate, angles very broadly rounded; apex very feebly emarginate, angles not at all rounded; disk feebly, evenly convex, punctured like the head and without distinct trace of impressions. *Elytra* quadrate, parallel; sides nearly straight; disk just perceptibly wider and scarcely two-fifths longer than the prothorax, excessively minutely and densely granulose, the recumbent pubescence excessively short, silvery, the erect hairs distinct. *Abdomen* long and linear, very slightly narrower than the elytra; sides straight and parallel; border moderate; surface more coarsely and sparsely punctate-reticulate; punctures strong; the apex of the sixth segment broadly feebly sinuate in the middle, with the edge fringed with a close series of pale porrected membranous hairs. *Legs* somewhat slender. Length 1.4 mm..

New York (near the city 1). Mr. W. Jülich.

This species, the largest of this section of the genus, approaches very near to *flavicornis* in general form, especially in its comparatively short elytra and large unimpressed prothorax; it differs in its much larger size, in its longer abdominal segments, in color, and in its much more coarsely granulose and less abbreviated elytra. In *flavicornis* the elytra together are very distinctly wider than long, while in the present species they are quadrate.

T. macropterus Lec.—Trans. Am. Ent. Soc., VI, p. 241.—Rather robust, piceous-black throughout the body, legs and antennæ; integuments very dull, the minute recumbent pubescence of the anterior portions fulvous, the sparser suberect hairs cinereous. *Head* as long as wide, rather small, feebly convex, minutely, very densely punctate, the punctures not completely coalescent and rather distinctly definable; eyes rather large, the tempora not as prominent and less than one-half as long; tuberculations feeble; antennæ distinctly longer than the head and prothorax, moderately robust, distinctly clavate, second joint rather more than twice as long as wide and nearly as long as the next two together, third much less robust, elongate, nearly twice as long as wide, fourth very slightly longer than wide, slightly longer and less robust than the sixth, the latter very slightly transverse, fifth more robust, distinctly longer than wide, outer joints very slightly transverse, eleventh more robust, ovoidal, abruptly pointed, one-half longer than wide. *Prothorax* nearly one-third wider than the head, two-thirds wider than long, almost semicircularly rounded behind from the middle of the sides, the middle of the base less strongly arcuate; sides before the middle slightly convergent; apex strongly, evenly sinuate throughout the width, angles not at all rounded and very distinct; disk rather more finely sculptured than the head, granulose, evenly, feebly convex, without trace of impressions. *Elytra* one-third wider and four-fifths longer than the prothorax; sides parallel and distinctly arcuate; surface

strongly, densely granulose. *Abdomen* very short, strongly convergent toward apex, slightly narrower than the elytra; border rather wide and shallow; surface more coarsely and sparsely punctato-reticulate, the sixth segment apparently with a fine coriaceous margin throughout the width. Length 0.9 mm.

California. Cab. LeConte.

A very distinct species, easily distinguishable from any other of this section by its more robust form, unimpressed pronotum, broadly emarginate apex of the prothorax, the head, prothorax and elytra increasing in width in an almost uniform ratio, by the distinctly arcuate sides of the elytra, the longer, more aberrant antennæ, and many other characters. The measurements of length given by LeConte in his descriptions of the species of this genus are decidedly too small.

T. sonomæ n. sp.—Rather slender, moderately depressed, piceous-black throughout the body, legs and antennæ, the elytra with a feeble castaneous tinge; integuments rather dull. *Head* fully as long as wide, feebly, evenly convex, very finely, feebly and densely punctate; antennal tuberculations very feeble; eyes rather large, feebly convex, very coarsely faceted, the tempora scarcely as prominent and about two-thirds as long, broadly rounded; antennæ rather robust, distinctly clavate, scarcely longer than the head and prothorax, second joint rather more than twice as long as wide and very slightly shorter than the next two combined, third distinctly longer than the fourth, the latter fully as long as wide, shorter than the fifth and subequal to the sixth, eleventh ovoidal, pointed, two-thirds longer than wide. *Prothorax* slightly but distinctly wider than the head, nearly three-fourths wider than long; sides parallel, feebly arcuate, the basal angles obsolete, very broadly rounded into the base which is broadly feebly arcuate; apex broadly, very feebly emarginate, the apical angles slightly advanced and very narrowly rounded; disk not at all impressed, feebly convex, very minutely and densely punctate throughout. *Scutellum* very small, equilatero-triangular. *Elytra* parallel, one-third wider and four-fifths longer than the prothorax; disk nearly flat, strongly impressed at the scutellum, extremely minutely, densely punctate; pubescence excessively fine, short and dense, the longer erect hairs sparsely distributed over the surface. *Abdomen* very slightly narrower than the elytra, rather short, slightly narrowed toward apex; border narrow and deep; surface more coarsely and sparsely punctate, also coarsely reticulate, and a little more shining than the other portions, the sixth segment distinctly shining. *Legs* rather short and robust. Length 1.2 mm.

California (Duncan's Mills, Sonoma Co. 2).

May be distinguished from *pygmæus* by its larger size, longer, relatively narrower prothorax, with the apical angles more advanced, and by the entire absence of any distinct pronotal impressions. The punctuation is slightly finer and denser than in that species.

T. fimbriatus Lec.—Trans. Am. Ent. Soc., VI, p. 240.—Somewhat robust, dark piceo-castaneous; antennæ same; legs slightly paler; integuments dull. *Head* fully as long as wide, very feebly and evenly convex, very minutely and densely punctate; tuberculations small and feeble; transverse suture fine, arcuate, distinct; eyes moderate, feebly convex; tempora feebly arcuate, about as prominent and more than two-thirds as long as the eye; antennæ as long as the head and prothorax, not very robust, feebly clavate, second joint about twice as long as wide and scarcely as long as the next two together, third slightly longer than wide, fourth and sixth very little wider than long and but slightly smaller than the fifth, outer joints very slightly transverse, the eleventh ovoidal, gradually pointed, two-thirds longer than wide. *Prothorax* very slightly wider than the head, five-sixths wider than long; sides parallel, strongly, evenly arcuate; base feebly arcuate, angles very broadly rounded; apex truncate or very feebly sinuate, the angles slightly obtuse and not perceptibly rounded; disk feebly convex, punctured like the head, with two feeble, distant, basal impressions. *Elytra* not wider and four-fifths longer than the prothorax, parallel, depressed, punctured like the prothorax but rather more finely, the fine dense recumbent hairs so small as to be not distinctly visible, the longer erect ones rather sparse and very distinct. *Abdomen* nearly as wide as the elytra, more coarsely punctato-reticulate; sides nearly parallel and straight; border narrow and deep. Length 0.7 mm.

Michigan (Detroit 1). Cab. LeConte.

This species bears considerable resemblance to *hesperius*, but may be distinguished by its more robust form, larger, wider prothorax, and relatively shorter elytra. In the type, the abdomen is drawn up so as to be very short, and the length given is therefore less than the normal one for the species; the length given by LeConte (0.5 mm) is not correct.

T. hesperius n. sp.—Slender, piceo-castaneous; legs and antennæ throughout same; integuments dull and dense. *Head* fully as long as wide, rather feebly, evenly convex, very densely granulato-punctate; prominences moderate in size, feeble; eyes large, feebly convex, very coarsely faceted, the tempora not quite as prominent, feebly arcuate and scarcely more than one-half as long; antennæ equal in length to the head and prothorax, moderately robust, distinctly clavate, second joint oval, twice as long as wide, as long as the next two together, third as wide as long, fourth and sixth equal, smallest, distinctly transverse, fifth subequal to the third, outer joints feebly transverse, eleventh ovoidal, pointed, two-fifths longer than wide. *Prothorax* very slightly wider than the head, five-sixths wider than long; sides parallel anteriorly and distinctly arcuate; base broadly arcuate, coarctate with the sides through the very broadly rounded basal angles; apex broadly, feebly arcuate; apical angles slightly obtuse, not distinctly rounded; disk feebly, evenly convex, punctate like the head, with two small feeble impressions at the base, trisecting the

width. *Elytra* parallel, scarcely one-fifth wider than the prothorax and fully twice as long; humeri right and very narrowly rounded; surface feebly convex, extremely densely and finely punctato-granulose, the short appressed pubescence correspondingly dense, and the longer erect hairs somewhat dense, very small and not easily seen. *Abdomen* very slightly narrower than the elytra and subequal in length, feebly narrowed toward tip; border moderate in width and depth; surface feebly convex, more coarsely punctato-reticulate and rather more shining, the pubescence coarser, as usual. Length 0.8 mm.

California (Fort Yuma 3).

This species may be distinguished by its slender form, piceous-black antennæ, short prothorax, and long elytra.

T. pygmæus n. sp.—Rather slender and depressed, black throughout; legs and antennæ same; integuments rather dull. *Head* fully as long as wide and distinctly longer than the prothorax, very feebly, evenly convex, very minutely, densely punctate; tuberculations very feeble; transverse epistomal suture very distinct; eyes large, feebly convex, the tempora nearly as prominent, very feebly arcuate and nearly two-thirds as long as the eye; antennæ just visibly longer than the head and prothorax, feebly clavate, second joint slightly less than twice as long as wide, nearly as long as the next two together, the third very much longer than the fourth which is slightly transverse, subequal to the sixth, the fifth larger and very slightly wider than long, eleventh one-half longer than wide, ovoidal, abruptly pointed. *Prothorax* slightly wider than the head, very slightly less than twice as wide as long; sides parallel and strongly arcuate; basal angles very broadly rounded, the base feebly arcuate; apex truncate, the apical angles slightly obtuse and scarcely at all rounded, scarcely perceptibly advanced; disk broadly, feebly convex, extremely minutely and densely punctate throughout, and broadly strongly impressed on each side at the base, the impressions trisecting the width. *Elytra* slightly wider than the prothorax, and about twice as long, parallel, very minutely, densely punctate and pubescent, the longer suberect hairs very short, somewhat dense and not very distinct. *Abdomen* slightly narrower than the elytra, slightly narrowed toward tip, short; border rather thick, flat and shallow, the surface transversely convex, more coarsely, sparsely punctate, and slightly shining, especially the sixth segment. *Legs* moderate. Length 1.0 mm.

Nevada (Reno 1).

The abdomen with its somewhat convex surface, and very shallow and rather wide border, contrasts greatly with the same part as seen in *sonomæ*, but the structure of this part seems to vary considerably within specific limits; even in the mature state.

The three species last described are more closely allied than usual, and, although easily distinguishable in nature by peculiarities of

form, size and sculpture, are not so satisfactorily differentiated by description.

The following group of three species is very distinct in the long slender antennæ, with all the joints elongate, and may be further identified by the abdomen rather strongly narrowed from base to apex, by the large subrectangular prothorax, with the disk perfectly even and free from impressions, by the slightly sparser, finer punctures, with the surface correspondingly more shining, and by the decidedly larger size.

T. antennarius Fauv.—Bull. Soc. Linn. Norm., Ser. 3, Vol. II, p. 97.

I have not been able to examine this species in nature, and the characters given in the table were taken from the original description of M. Fauvel.

T. pallidus n. sp.—Rather slender and fusiform, feebly convex, pale brown; abdomen piceous; legs and antennæ pale flavate; integuments slightly shining. *Head* about as long as wide, rapidly narrowed and triangular in front of the eyes; sides in basal half parallel; surface subdepressed, very minutely punctate-reticulate, finely pubescent; eyes moderate, rather convex, very coarsely faceted; antennæ much longer than the head and prothorax, very slender, scarcely visibly incrassate, all the joints much longer than wide, second shorter than the next two, fourth and sixth slightly shorter than the third and fifth, and very slightly more slender, tenth nearly one-half longer than wide, eleventh slender, cylindrical, abruptly pointed at apex, nearly three times as long as wide. *Prothorax* slightly though distinctly wider than the head, about one-sixth wider than long; base and apex subequal, very feebly arcuate; sides parallel, feebly arcuate; apical angles narrowly, basal more broadly rounded; disk broadly, feebly convex, more strongly so near the margins, even, without trace of impressions, more strongly shining, subalutaceous, very minutely and excessively feebly punctate. *Elytra* about one-fourth wider and two-fifths longer than the prothorax, parallel, subquadrate; sides nearly straight; surface very feebly convex, alutaceous, excessively minutely punctate, the punctures smaller but stronger than those of the prothorax, not in mutual contact. *Abdomen*, narrowed toward apex, very slightly narrower than the elytra; segments rather long; border strong, not very deep; surface strongly alutaceous, reticulate in broken transverse wavy lines, the interspaces dull. Length 1.2 mm.

Texas (Austin 2).

The pubescence of the anterior portion is very fine and dense; it is suberect, and is not intermingled with longer hairs as in the preceding section. It belongs near *antennarius* of Fauvel, but is a much smaller species.

T. gracilicornis n. sp.—Moderately slender and fusiform, feebly convex, black; legs and antennæ throughout piceous-black; integuments alutaceous. *Head* small, nearly as long as wide; sides parallel in basal half; surface very feebly convex, finely, densely punctate; tuberculations moderate, rather distinctly elevated; eyes rather large and convex, very coarsely faceted; sides behind them very short, about one-third as long and obtusely, narrowly rounded; antennæ very slender, much longer than the head and prothorax, extremely feebly incrassate, all the joints longer than wide, second shorter than the next two, fourth and fifth subequal, longer than the sixth and shorter than the third, ninth longer than the tenth, the latter but slightly longer than wide, eleventh cylindrical, abruptly pointed, two and one-half times as long as wide. *Prothorax* rather more than one-fourth wider than the head, one-sixth wider than long; base scarcely perceptibly narrower than the apex, both feebly arcuate; sides nearly parallel, feebly arcuate; apical angles narrowly but distinctly, basal broadly, rounded; disk evenly and rather distinctly convex, without trace of impressions, very minutely, feebly punctate; punctures not distinctly definable. *Elytra* one-third wider and nearly one-half longer than the prothorax, quadrate, depressed; sides parallel and nearly straight; surface extremely minutely, densely punctate and pubescent. *Abdomen* gradually narrowed from base to apex, slightly narrower than the elytra; segments rather long; border moderate, not very deep; surface dull, finely and strongly punctato-reticulate, the reticulations small and slightly transverse. Length 1.5 mm.

California (Sonoma, San Mateo and Santa Clara Cos. 8).

This species seems to vary slightly in the relative proportion of its parts, but I can perceive no well-defined limits of a specific nature. It is very distinct from *pallidus* in its larger size, black color, smaller head, finer, stronger abdominal sculpture, and several other characters.

T. crassicornis n. sp.—Extremely slender, linear, subdepressed, pale brownish-flavate; legs and antennæ very pale flavate; integuments shining, the pubescence moderate in length although somewhat dense. *Head* nearly as long as wide, feebly, evenly convex above, rather coarsely and sparsely punctate, the interspaces fully twice as wide as the punctures, polished, the epistoma on a slightly lower plane than the front, the suture short, strongly arcuate and very distinct; tuberculations small but rather prominent; eyes moderate; tempora parallel, abruptly rectangular behind, the head being transversely truncate at base; antennæ fully as long as the head and prothorax, robust, distinctly incrassate, the second joint very short, scarcely one-third longer than wide and slightly shorter than the next two together, third transversely oval, fourth and sixth rather wider than the third, very strongly transverse, about equal in width to the fifth but rather shorter, the latter nearly twice as wide as long, outer joints very strongly transverse, twice as wide as long, the eleventh ovoidal, pointed, one-third longer than wide. *Prothorax* equal in width to the head and very slightly shorter, two-fifths wider

than long; sides parallel, just visibly arcuate; apex and base equally and feebly arcuate; apical angles very narrowly, basal more broadly, rounded; disk feebly convex, somewhat coarsely and sparsely punctate, with two strong parallel impressions in the middle, also strongly impressed at the lateral edges in the basal half, and more narrowly so in the anterior half, the edge being explanate or very feebly reflexed. *Elytra* slightly longer than wide, one-sixth wider and four-fifths longer than the prothorax; sides parallel and straight; disk rather coarsely and sparsely punctate, the punctures separated by from once to twice their own widths, and rather closer than those of the head and prothorax. *Abdomen* long, linear, slightly narrower than the elytra; sides nearly straight, parallel; border rather wide, very shallow; surface finely reticulate, finely, not densely, and subasperately punctate, the punctures not sparser but much finer than those of the head; apical margin of the sixth segment narrowly free from punctures, smooth and polished. *Legs* short. Length 1.1 mm.

Texas (Austin 1).

A remarkably distinct species, decidedly aberrant in the strong and complex impressions of the pronotum, and unusually robust antennæ. The punctuation is very much sparser than in any other species known to me.

T. validus n. sp.—Slender, depressed, linear, black throughout; elytra slightly piceous; tibiæ slightly paler, flavo-piceous; integuments rather shining. *Head* scarcely as long as wide, flattened above, vertex in the middle just behind the line of antennal insertion more strongly convex; tuberculations rather large, not very strong; surface coarsely, deeply and rather densely punctate; eyes rather small, feebly convex; tempora parallel, feebly arcuate, as prominent as the eye and nearly as long; antennæ slightly longer than the head and prothorax, robust, distinctly incrassate, second joint fully as long as the next two, third obconical, very slightly longer than wide, fourth and sixth smaller, distinctly transverse, fifth larger, very slightly wider than long, outer joints rather distinctly transverse, eleventh robust, ovoidal, not one-half longer than wide, rather abruptly pointed. *Prothorax* equal in width to the head and distinctly shorter, fully one-half wider than long; sides feebly convergent from near the apex to the base, and scarcely visibly arcuate; apical angles rather broadly rounded; apex very feebly arcuate; base strongly arcuate throughout the width, the angles obtuse and distinctly rounded; disk feebly convex, rather coarsely, deeply and densely punctate, with two large wide very feeble longitudinal impressions in the middle, without lateral impressions. *Elytra* one-third wider than the prothorax, distinctly longer than wide, more than twice as long as the prothorax and slightly longer than the head and prothorax together; sides parallel and almost perfectly straight; disk depressed, rather coarsely, deeply and densely punctate, the punctures rather smaller than those of the pronotum and separated by nearly one-half their own widths. *Abdomen* rather distinctly narrower than the elytra; sides parallel and straight; border narrow, moderate in depth; seg-

ments moderate in length; the sixth very much longer than the fifth, with the apex for one-fifth the length perfectly smooth and polished; surface feebly reticulate, very minutely and rather sparsely punctate, more strongly shining. Length 1.6 mm.

California (Mendocino, Sonoma and Marin Cos. 11).

The pubescence in this well-marked species is not very dense, and is somewhat longer than usual. The anterior legs throughout, together with the coxæ, are pale flavate, the posterior piceous, the posterior tibiæ having, at the middle of the exterior edge, a long erect seta, which seems to be a constant generic character, but becoming here more than usually pronounced. It is gregarious on the under surface of chips and stones near running water, and its motions are extremely slow, differing greatly from the normal forms, as for instance *hesperius*, which are never gregarious, and which move much more rapidly over the sand and adobe mud of the river bank. Similar differences of habit are well known in the genus *Trogophlæus*.

PHALACRIDÆ.

With the exception of a few more or less isolated descriptions, the representatives of this family have of late years been greatly neglected by systematists. The study of the European species has, however, been recently resumed by Tournier and Flach, and the description of several interesting new genera by Dr. Sharp in the *Biologia Centrali-Americana*, has served to revive a still more general interest. In the following pages I have attempted to perform a corresponding service for the North American species.¹

The family seems to be more especially characteristic of the American, than of the European fauna, for it is here that it reaches its greatest development, not only in the number and variety of its species, but more noticeably in the unexpected number of distinct and highly specialized generic groups. Although to a superficial view presenting a very monotonous and little varied appearance, I have found the study of the American species a highly interesting one, the various genera being quite abruptly limited, and characterized by an unusual paucity of intergrading forms.

¹ *Olibrus piceus* Boh., mentioned by Gemm. and Harold (Cat. Col. p. 801) as described from California, cannot be identified, and, as the name is pre-occupied, should be dropped from our lists. *Phalacrus difformis* Lec. (Agass. L. Sup. 222) is an Agathidium. *Litochrus brunnipennis* Maun. is a Choleva.

In the general classification of the genera I have departed from the original Erichsonian system, based upon the relative length of the anterior and posterior tarsi and visibility of the terminal spurs, and have taken as the most important characters in the primary grouping, the structure of the eye and tibial spurs, the mode of antennal insertion, and the size of the scutellum. In the Olibri the point of antennal insertion is exposed from above, the large irregular pit or fovea in front of the under part of the eye being very shallow, because of the deep sinuation of the sides of the epistoma. In all the genera of this group there is visible, just above the point of insertion and immediately under the extreme upper edge of the epistoma, a round flattened chitinous tubercle, apparently entirely filling a deep fovea; this is very constant in all the genera, but its significance cannot be determined.

The variation in the form of the trophi in passing from one genus to another, appears to be of so little importance in comparison to the sternal and tarsal structure, that but slight use has been made of these parts, and they have been totally disregarded in the scheme of arrangement here proposed. They are, however, of somewhat greater moment in the Litochride genera, as will appear below.

In the following table I have included all the described genera, indicating those which do not occur within the faunal limits of the United States by an asterisk.¹ The genus *Augasmus* Mots. is said by Tournier to be identical with *Phalacrus*, and the recently described *Olibrosoma* of Tournier, seems to be so aberrant in its five-jointed antennal club, that I think it would be better to exclude it from the family as at present organized; it may possibly find a more fitting place in the Silphidæ. With these exceptions, therefore, the family is found to consist of three groups of genera which may be defined as follows:—

Eyes of dual structure, the upper portion finely faceted, the lower coarsely so; spurs of posterior tibiæ strongly dilated.

Antennæ exposed at base, the epistoma projecting and trapezoidal; scutellum small or moderate; elytra striate throughout the width.....*TOLYPH*

Eyes normal, coarsely faceted throughout; spurs of posterior tibiæ not at all dilated.

Antennæ inserted under the sides of the front, the base entirely concealed

¹ Through the generosity of Dr. Sharp, I have been able to study all of the Central American genera recognized by this distinguished author, and recently published in the *Biologia Centrali-Americana*.

from above, and the margin of the epistoma evenly coarctate; scutellum large**PHALACRI**
 Antennæ inserted at the sides of the front, the base visible from above, the margin of the epistoma above the point of insertion being more or less sinuate; scutellum small or moderate**OLIBRI**

The genera composing the groups may be defined as follows:—

TOLYPHI.

Sides of the prothorax not coarctate with those of the elytra....***Tolyphus**

PHALACRI.

Spurs of posterior tibiæ very short, not projecting beyond the terminal fringe of spinules; elytra with a discal stria**Phalacrus**

Spurs of posterior tibiæ long and distinct; elytra entirely devoid of striæ.

Phalacropsis

OLIBRI.

Basal joint of the posterior tarsi shorter than the second.

Apex of the prosternal process inflexed, without an acute and free edge, and devoid of spinose setæ; metasternal process greatly developed, the mesosternum before it reduced to a fine bead.

Elytra with one or two discal striæ, the suture beaded; second joint of the posterior tarsi moderate in length, free.....**Olibrus**

Elytra with a single discal stria, the suture not beaded; second joint of the posterior tarsi moderate in length, rigidly articulated with the basal joint.....**Olibroporus**

Elytra entirely devoid of discal striæ; second joint of the posterior tarsi greatly elongate, subanchylosed to the first.....***Enlitrus**

Apex of the prosternal process with an acute free edge bearing a transverse series of spinose setæ; mesosternum more developed in front of the metasternal process; elytra constantly with a single discal stria, the suture not beaded.

Mesosternum not prolonged behind the middle acetabula; second joint of the posterior tarsi very long, subanchylosed to the first.

Litolibrus

Mesosternum prolonged and sometimes greatly developed behind the middle acetabula.

Second joint of the posterior tarsi very long, spongy-pubescent beneath in the male, the articulation with the first joint rigid; posterior tibial spurs long, very unequal; sexual differences in the posterior tibiæ, terminal spurs and tarsi strongly marked**Acylomus**

Second joint moderate in length, anchylosed rigidly to the basal joint, clothed throughout with small subrecumbent spinose setæ; tibial spurs moderate***Liophalacrus**

Second joint moderate in length, finely pubescent beneath in both sexes; articulation with the basal joint free; tibial spurs small and inconspicuous; sexual differences in the posterior legs not observa-

ble, the male sexual characters, when visible, affecting the abdominal segments only **Stilbus**
 Basal joint of the posterior tarsi longer than the second; elytra with two discal striæ.

Prosternal process inflexed at apex, devoid of terminal setæ.

Basal joint of the posterior tarsi extremely elongate, much longer than the entire remainder; mesosternum not extending behind the middle acetabula except as a fine marginal bead; sexual differences in the posterior legs not observable **Litochrus**

Basal joint elongate but distinctly shorter than the remaining joints combined; mesosternum extending behind the middle acetabula, where it is moderately developed; sexual differences in the posterior legs conspicuous **Litochropus**

Prosternal process not inflexed, having a free acute edge..... **Ochrolitus**

TOLYPHUS Ericha.

The antennæ in this genus are unusually short and robust, the two basal joints of the club strongly transverse. The prosternal process is rather wide, gradually inflexed at apex, and margined throughout the sides and apex with a fine strong convex bead; it is not in the least setose, and, in repose, rests against the vertical portion of the mesosternum. The metasternal process is rather narrower than in *Phalacrus*, but similar in form and extent, the mesosternum forming a fine apical and lateral bead. The mesosternum behind the middle acetabula forms a fine bead as in *Phalacrus*.

The terminal spurs of the posterior tibiæ are short, although projecting well beyond the terminal fringe of spinules; they are very strongly dilated toward base and pointed at apex.

The singular structure of the eyes mentioned in the table, together with the structure of the tibial spurs, isolates *Tolyphus* widely from the entire remainder of the family, and constitutes of it a group equivalent to either the *Phalacri* or *Olibri*. The first of these characters, neither of which has apparently been before noticed, is of exceedingly rare occurrence in the Coleoptera; the second is often seen as a modification of the anterior spurs in the *Harpalini*.

The observations above noted were made upon *T. granulatus* Guér. from Spain. No species has yet occurred outside of the Mediterranean province of the palæarctic fauna.

PHALACRUS Payk.

The general characters distinguishing this genus from the others are fully laid down in systematic works, and are stated in a less extended form in the preceding table.

The species do not appear to be very numerous, and among the sixty-seven specimens before me, I am unable to distinguish more than eight, which is considerably less than the eighteen described by Tournier (L'Ent. Gen. 1889, pp. 7-10), as belonging to the European fauna. The species are more closely allied and indefinite than in any other genus of the family. I have not noticed any distinct sexual modification in the male; the middle of the anterior margin of the epistoma is, however, in some forms broadly arcuate and coarctate with the sides and in others more or less truncate, and these differences are said by both Tournier and Flach to be sexual in origin. I have not attempted to verify this, and have simply mentioned the form of the apical margin when noticed during description.

The punctures of the head mentioned by Tournier, are present in all our species, but I have not been able to employ them in separating or characterizing the species, as they appear to vary in relative position in different individuals. These little fovea to the number of four, are situated along the inner margin of the eye, and there is also another near the anterior margin of the epistoma, and remote from the eye; they are not setigerous as far as can be observed with the highest working powers.

The sculpture of the elytra is moderately constant, but the impressed lines lying parallel to and near, but not including the series of punctures, are more or less variable in distinctness, and do not seem to form a specific character of very great importance.

On each elytron in some if not all the species there are certain short stiff and erect setæ, which do not appear to have been previously noticed, and which in *simplex* are disposed as follows:—

A row of very closely-placed excessively minute setæ along the under surface of the acute lateral edge, projecting downward.

A row of more distant, longer and coarser setæ, very close to the minute bead forming the lateral edge, or just within its outer limit.

Finally, on the disk of each elytron, five rows of excessively minute stiff setæ which are extremely widely spaced, and more evident toward apex. The fifth row from the suture contains six

or seven setæ and extends nearly to the base, the fourth row four setæ, extending to about one-fourth the length from the base, the third row about three setæ, extending slightly beyond the middle, the second row two, extending nearly to the middle, the first row being between the sutural and discal striæ and containing two to four setæ.

The setæ are more widely spaced in the rows toward the suture, except in the first row where they become slightly less distant. The setigerous punctures may or may not coincide with the punctures of the series; and do not differ greatly from them in form, being merely a little more pronounced. In some species they are not visible at all, but as far as I have been able to observe the marginal line of larger, more closely placed setæ never becomes obsolete. These are entirely distinct from the excessively minute fine recumbent hairs, borne by the ordinary punctures, and no doubt serve quite a different purpose.

In the following table only those characters are employed which appear to be of decided importance; they relate to the sternal, tarsal and antennal structure, and elytral sculpture, and weight should perhaps be assigned to them in the order named:—

Metasternal process not extending beyond the middle coxæ, truncate at apex.

ovalis

Metasternal process projecting beyond the middle coxæ, more or less strongly rounded at apex.

Third antennal joint equal in length to the two following united.

Elytra entirely polished, or with but slight trace of reticulation toward apex.

Punctures of series very fine, not becoming decidedly coarser at the sides.

Form robust, suboblong; size large.....**penicillatus**

Form less robust, evenly elliptical; smaller in size.....**Sayi**

Punctures of series very fine, becoming abruptly much larger and broadly lunate at the sides; form narrowly oval and slightly narrowed behind.....**simplex**

Elytra finely and more or less feebly reticulate over the entire surface.

Punctures of elytral series extremely feeble and rather indistinct.

Antennæ pale; sternal processes very wide, the metasternal scarcely more than twice as wide as the prosternal; form very broadly oval.....**politus**

Antennæ black; metasternal process narrower, more strongly rounded at apex and about three times as wide as the prosternal; form more narrowly oval; reticulation of upper surface much more feeble.

conjunctus

Punctures of series very strong, the series equal, approximate and very distinct, extending almost to the base.....**seriatus**
 Third joint of antennæ distinctly shorter than the two following united ; upper surface finely, feebly reticulate.....**pumilio**

P. ovalis Lec.—Proc. Ac. Phil., 1856, p. 15.—Evenly elliptical, one-half longer than wide, intense black throughout; legs, trophi and antennæ same; highly polished. *Head* and antennæ nearly as in *penicillatus*. *Prothorax* at base twice as wide as the head, a little more than twice as wide as long, very minutely, feebly and rather sparsely punctate, otherwise as in *penicillatus*. *Scutellum* large, two-thirds wider than long; triangular; sides arcuate; apex narrowly rounded; surface very minutely and almost imperceptibly punctate. *Elytra* two and one-half times as long as the prothorax, gradually, evenly, semi-circularly rounded behind, polished but having very indistinct traces of coarse reticulation toward apex, punctured in approximate rows of small rather closely-placed rounded and distinct punctures, which become nearly obsolete toward base, the alternate rows being decidedly more distinct and even, the intermediate rows composed of much smaller and feebler punctures, quite unevenly arranged; sutural bead fine and distinct, the stria continuous along the scutellum and with the basal stria; discal stria strong, vanishing at from one-fifth to one-sixth the length from the base. *Abdomen* clothed rather densely in the middle, and very sparsely toward the sides, with coarse hairs. *Legs* robust; posterior tarsi slender, two-thirds as long as the tibia, with the first joint scarcely one-half as long as the second. Length 1.8–2.5 mm.

California (Sonoma and Monterey Cos.).

The metasternum projects between the middle coxæ to the anterior limit of the latter; it is broad and subtruncate at apex, between three and four times as wide as the narrowest part of the prosternal process, and the mesosternum forms a fine bead in the middle portions of the apex, which becomes much more evident at the sides.

The species resembles *penicillatus* very closely in sculpture and coloration, but is smaller, the largest specimens being equal in size to the smallest of that species; its form is more narrowly and evenly elliptical, and the structure of the meso-intercoxal parts quite different. In *penicillatus* the metasternal process extending beyond the anterior limit of the middle coxæ, the mesosternum is excavated under the overreaching visible portions, while in the present species the mesosternum, excepting the portion forming the very fine terminal bead of the metasternum, forms a very feebly concave perpendicular surface.

P. penicillatus Say.—Journ. Ac. Phil., IV, p. 91.—Robust, somewhat oblong; sides feebly arcuate in the middle, subtruncate behind; highly polished, intense black throughout the body, legs, trophi and antennæ, the

latter sometimes slightly piceous. *Head* twice as wide as long, feebly, evenly convex; eyes moderate, their surface perfectly continuous in convexity with the front, and their lateral margin coarctate with the anterior margin of the head, the latter perfectly evenly arcuate throughout in circular segment; surface finely and somewhat sparsely punctate; antennæ moderate, funicle very slender, third joint as long as the next two, club as long as the five preceding joints combined, the last joint one-third longer than the ninth and tenth combined. *Prothorax* twice as wide as the head, and two and one-half times as wide as long; base transverse, very feebly broadly sinuate at each side of the scutellum; bead very feeble and entirely obsolete in lateral third; sides evenly arcuate; disk very finely and rather sparsely punctate. Scutellum large, nearly twice as wide as long; sides feebly arcuate; apex narrowly rounded; surface very finely, feebly punctate except toward the margins. *Elytra* about three times as long as the prothorax, abruptly rounded behind; sutural stria very fine, forming a narrow sutural bead, continuous along the scutellum with the transverse basal stria, the single discal stria fine but distinct, joining the sutural at the apex, and becoming obsolete at one-fifth the length from the base; disk highly polished, without reticulation, having equidistant approximate rows of fine rounded feeble punctures, the alternate rows being slightly better defined, the punctures becoming obsolete toward base, and scarcely perceptibly larger near the sides and apex. *Abdomen* clothed rather sparsely with stiff semi-erect hairs. *Legs* robust; middle and hind femora with a row of stiff hairs along the posterior lower edge, which become longer near the apex; anterior femora without trace of such hairs, posterior clothed on the lower surface with coarse yellowish hair; terminal spinules of posterior tibiæ short, even, concealing the spurs, the corresponding tarsi short, with the first joint about one-half as long as the second. Length 2.3-3.0 mm.

Southern California; Arizona; New Mexico.

In the type, which is one of the larger specimens from Southern California, the metasternal process projects well beyond the middle coxæ, the apex being broadly arcuate or subtruncate, the mesosternum forming a thickened and very strong apical bead; the width of the portion between the middle coxæ is three times as great as the narrowest part of the prosternal process; the latter is impressed. In other specimens the metasternal process is nearly four times as wide as the prosternal, more strongly arcuate, and more finely beaded at apex.

P. Sayi n. sp.—Evenly elliptical, convex, highly polished, about one-half longer than wide, intense black throughout above and beneath, the antennæ just visibly piceous toward base. *Head* very minutely, rather sparsely punctate; eyes small; antennæ moderate, third joint as long as the next two together, club very slender, the eleventh joint distinctly longer than the two preceding together. *Prothorax* very minutely sparsely and feebly punctate, extremely broadly feebly lobed at base; beaded margin evident in the middle.

Scutellum triangular, one-half wider than long; sides feebly arcuate. *Elytra* having series of minute, feeble and rather distant punctures, which are but slightly more distinct and but slightly closer at the sides, not in the least reticulate; discal stria fine and distinct, obsolete at basal fourth. Posterior tarsi very slender, the third joint elongate, not dilated and not wider than the second. Length 1.7 mm.

Arizona (Coolidge).

The metasternal process, as usual, projects beyond the coxæ and is strongly rounded at apex, with a fine apical bead; it is about three times as wide as the prosternal process, the latter moderate in width.

This species very greatly resembles *simplex*, but differs in its finer, feebler, sparser and less dilated punctures at the sides of the elytra, in its still more slender posterior tarsi, and in its decidedly smaller size. It is represented by two specimens, collected by Mr H. F. Wickham.

P. simplex Lec.—Proc. Ac. Phil., 1856, p. 16.—Ovoidal, more pointed behind, black; legs and antennæ piceo-testaceous; upper surface highly polished. Head feebly subtruncate in the middle at apex, feebly convex, very minutely feebly and sparsely punctate; antennæ rather short, the club about as long as the six preceding joints together, not very robust, the eleventh joint one-half wider than the ninth and nearly one-half longer than the two preceding together. Prothorax slightly more than twice as wide as long, two-thirds wider at base than at apex; basal bead almost completely obsolete; disk very minutely, sparsely and feebly punctate. Scutellum large, two-thirds wider than long, triangular, the sides very feebly arcuate, and the apex just visibly rounded, the surface extremely finely sparsely and obsoletely punctate. *Elytra* about two and one-third times as long as the prothorax, gradually narrowed behind and acutely rounded at apex, the sutural stria very fine and as usual continuous along the scutellum, the discal stria fine but distinct, terminating at one-fifth the length from the base; disk polished, not at all reticulate or subgranulose, except very obsoletely so near the apex, and in the very vaguely impressed striæ adjacent to the ill-defined rows of punctures, the latter very fine and feeble except near the sides and apex, where they become abruptly unusually large, strong and broadly lunate; the vaguely defined impressed lines are, however, more or less definable nearly to the base. Abdomen covered sparsely with very coarse hairs, denser toward the middle. Legs moderate; posterior tarsi slender, nearly three-fourths as long as the tibiae, the basal joint not quite one-half as long as the second. Length 1.9–2.5 mm.

New Mexico; Texas; Iowa.

The metasternal process is broad, distinctly prolonged beyond the middle coxæ, broadly and distinctly rounded and subtruncate in the middle at apex, with the mesosternal bead rather fine. The vague impressed lines of the elytra, which are distinctly visible in some

specimens of which the original type is one, occasionally entirely disappear.

There are before me two specimens collected at Luna, New Mexico, by Mr. Wickham, which appear to belong to this species; they are nearly as small as *Sayi*, and notably smaller than any other specimens of *simplex* which I have seen. I prefer to attach them provisionally to *simplex*, because the punctures at the sides of the elytra are wide and deeply impressed, as in that species, but they are not included in the above measurement of length.

P. politus Melsh.—Proc. Ac. Phil., II, p. 102.—Broadly oval, from one-third to two-fifths longer than wide, black above and beneath; legs and antennæ paler, dark rufo-testaceous; moderately shining. *Head* feebly subtruncate at apex, very minutely, feebly reticulate in broken wavy lines, finely, rather sparsely and distinctly punctate; antennæ rather slender, club much shorter than the six preceding joints combined, the last joint about one-third longer than the two preceding together. *Prothorax* twice as wide at base as at apex, and slightly more than twice as wide as long, the basal bead fine and distinct in middle third; disk excessively minutely and feebly reticulate in wavy lines, extremely minutely, feebly and rather sparsely punctate. *Scutellum* acutely ogival, one-half wider than long. *Elytra* about twice as long as the prothorax, not narrowed toward apex which is very broadly, evenly rounded; sutural stria continuous, very fine; discal fine, distinct, terminating at basal sixth; disk without distinct impressed lines, having approximate and nearly equal rows of fine feeble punctures, which do not become entirely obsolete at base, and rather abruptly much larger, stronger, partly confused and broadly lunate at the sides and apex; surface finely and distinctly reticulate, the reticulations extremely minute, and forming imperfectly defined transverse wavy rows toward base, coarse and more rounded toward sides and apex. *Abdomen* finely reticulate, rather coarsely, subasperately punctate, coarsely pubescent. *Tarsi* moderately slender, with unusually coarse and prominent tufts of yellowish hair beneath, the posterior two-thirds as long as the tibiæ, with the first joint scarcely one-half as long as the second. Length 1.5-2.2 mm.

Pennsylvania; North Carolina; Missouri; Texas.

The metasternal process projects far in advance of the middle coxæ, and is strongly rounded at apex, the apical bead rather fine and not at all dilated laterally, the prosternal process unusually wide, being at its narrowest part but slightly less than one-half as wide as the metasternal.

This species is very common and widely diffused; it does not appear to vary much except, as usual in this genus, in point of size. It is the least shining of any of our species except *pumilio*.

P. conjunctus n. sp.—Evenly elliptical, one-half longer than wide, black; legs and antennæ piceous-black; strongly shining. *Head* twice as wide as long, finely, rather sparsely but distinctly punctate; anterior margin subtruncate in the middle; antennæ rather robust, last joint of club moderately densely and rather coarsely pubescent, but slightly longer than the two preceding together. *Prothorax* rather distinctly more than twice as wide as long; base three-fourths wider than the apex, the former transverse, very feebly sinuate at each side of the scutellum; basal bead very feebly defined in the middle, obsolete laterally; disk very minutely sparsely and indistinctly punctate. Scutellum three-fourths wider than long, ogival, very minutely, feebly punctate except toward the edges. *Elytra* about two and one-half times as long as the prothorax, gradually, evenly and not obtusely rounded behind; sutural striæ very fine, entire, very closely bordering the scutellum; discal fine but distinct, vanishing at one-fifth the length from the base; disk very finely but distinctly reticulate throughout, punctured in approximate rows of small distinct feebly impressed punctures, the alternate rows not apparently more well-marked or even, the punctures being sensibly dilated and crescentiform, each with the usual minute recumbent hair, the reticulations and punctures stronger toward apex and the sides, and almost obsolete near the base. *Abdomen* sparsely clothed with coarse hair. *Legs* moderately robust; terminal spurs of posterior tibiæ small, short but distinct and not concealed by the even and closely-placed row of terminal spinules; corresponding tarsi rather slender, nearly three-fourths as long as the tibiæ, the basal joint two-thirds as long as the second. Length 1.8–2.3 mm.

California (San Diego); Arizona.

The metasternal process is of the usual width; it projects slightly beyond the middle coxæ, and is strongly rounded at the apex, the apical bead very fine and not much dilated laterally.

This species is not very closely related to any other, resembling *penicillatus* in sternal structure, but differing greatly in size, shape and sculpture.

P. seriatus Lec.—Proc. Ac. Phil., 1856, p. 15.—Broadly, evenly elliptical, less than one-half longer than wide, black; antennæ black; legs piceous-black, the tarsi dark piceo-testaceous; upper surface polished. *Head* finely but distinctly punctate, feebly subtruncate in the middle at apex; antennæ moderate, club rather robust, the last joint distinctly longer than the two preceding together. *Prothorax* fully twice as wide at base as at apex, and nearly two and one-half times as wide as long, the basal bead extremely fine and feeble; disk minutely and sparsely, but rather distinctly punctate, the surface not visibly reticulate. Scutellum nearly twice as wide as long, ogival; sides distinctly arcuate; surface very minutely punctate. *Elytra* nearly two and one-half times as long as the prothorax, very broadly, evenly rounded behind, the sutural and discal striæ as usual, the surface excessively finely, feebly and indistinctly reticulate, more visibly so near sides and apex; disk

with approximate and equal rows of very distinct punctures, which do not become larger at the sides, and which disappear only within a very short distance of the base. *Abdomen* reticulate in wavy lines, especially near the sides, coarsely pubescent. *Legs* robust, posterior tarsi somewhat robust, very densely, coarsely pubescent beneath, about one-third as long as the tibiae. Length 2.0 mm.

Kansas—Dr. LeConte; Colorado—Mr. Schwarz.

The description is taken from one of the Colorado specimens, as the original type cannot be found.

The metasternal process is rather narrower than usual, projects far beyond the middle coxæ, and is strongly rounded throughout at apex; it is scarcely three times as wide as the narrowest part of the prosternal process, and the apical bead is rather fine and not dilated laterally. It is a very distinct species in its strongly marked, approximate, equal rows of elytral punctures. The type exhibits no trace of impressed elytral lines.

P. pumilio Lec.—Proc. Ac. Phil., 1856, p. 16.—Evenly, rather broadly oval, scarcely one-half longer than wide, black above, piceous beneath; legs and antennæ pale yellowish-testaceous; rather strongly shining. *Head* as usual; antennæ rather robust, the club moderate, the eleventh joint but slightly longer than the two preceding combined, the third joint notably shorter than the fourth and fifth together. *Prothorax* very nearly as in *politus*. Scutellum ogival, nearly two-thirds wider than long. *Elytra* a little more than twice as long as the prothorax, not at all narrowed toward apex, broadly, evenly rounded behind, with reticulation and discal striæ nearly as in *politus*; having approximate and nearly equal rows of rather small and distant, and extremely feeble punctures which are, at the sides, much larger, more confused and broadly lunate; surface with very fine vague impressed lines, which are continuous nearly to the base. *Legs* moderately robust, short. Length 1.4 mm.

Middle Atlantic States.

The condition of the type, which is the only specimen which I have seen, prevents a description of the abdomen and posterior tarsi. The metasternal process is very wide, and projects far beyond the middle coxæ, the apex strongly rounded, the apical bead very strong and rather flat, not dilated laterally.

Pumilio greatly resembles a very small specimen of *politus*, almost exactly so in sculpture; it is, however, very distinct in several important points of structure, and notably in the antennæ, in which the third joint in *politus* is fully as long as the next two together, also in sternal structure, the prosternal process here being

much narrower and not over a third as wide as the metasternal. The punctures of the elytral series are, on the upper parts of the disk, rather more distant and decidedly more feeble than in *politus*. It appears to be very rare.

PHALACROPSIS n. gen.

Mentum trapezoidal, truncate at apex. Maxillary palpi with the last joint slender, subcylindrical, minutely truncate at apex, slightly narrower than the third, and nearly twice as long. Antennæ slender; third joint as long as the next two together; club slender, the ninth joint fully as wide as the tenth and slightly longer, eleventh narrower, elongate-oval, and slightly shorter than the two preceding. Prosternal process moderate in width, very feebly concave, inflexed, not ciliate at apex; metasternal process broad, fully three times as wide as the prosternal, projecting to the anterior limits of the coxal cavities, where it is transversely truncate, the truncation very feebly arcuate, the apical bead very fine in the middle, thickened at the lateral angles, and again fine along the coxal cavities. Legs short and very robust; spurs of the posterior tibiae slender, equal, nearly parallel, projecting distinctly beyond the spinose fimbria; the corresponding tarsi but very slightly longer than the anterior, nearly as in *Phalacrus*, with the basal joint less than one-half as long as the second. Pronotum without trace of basal bead in the middle. Scutellum large. Elytra not at all striate, having a very fine sutural bead, the fine stria being continuous with the basal stria along, and almost touching, the scutellum; discal stria entirely obsolete.

The single species forming the type of *Phalacropsis*, is quite peculiar in form, being decidedly more elongate-oval and just perceptibly more depressed than in the various forms of *Phalacrus*. Although remote, it is the nearest ally of *Tolyphus* in our fauna.

P. dispar Lec.—Bull. U. S. Geol. Survey, V, No. 3, p. 513.—Castaneous, evenly elongate-elliptical, fully three-fourths longer than wide, convex, polished. Head rather small, evenly rounded at apex throughout its width, very minutely sparsely and obsoletely punctate. Prothorax at base more than twice as wide as the head, polished, without trace of reticulation, very minutely, rather sparsely but distinctly punctate; base transverse, feebly sinuate at each side of the scutellum. Scutellum large, about twice as wide as long, ogival, very obsoletely finely and sparsely punctate. Elytra nearly three times as long as the prothorax, not narrowed behind, broadly, evenly rounded at apex, polished but having very indistinct traces of minute wavy reticulation, which becomes more evident and confused near the sides and apex; punctures lunate, arranged in rather poorly-defined distant series, the intervals with more confused punctures which are nearly equal to them in size, rather large but feeble, much larger, denser and more confused at the sides, where they are very broadly crescentic. Legs and under surface pale testaceous, sparsely, coarsely pubescent. Length 3.0 mm.

Colorado (Veta Pass). Mr. Schwarz.

I have only seen one specimen of this remarkable species.

OLIBRUS Erichs.

The genus *Olibrus* differs from *Phalacrus* in only two very important particulars, but in a large number of characters which must be considered of more or less subsidiary value. The two most marked differences are found in the mode of antennal insertion, and in the size of the scutellum. In *Phalacrus* and its allies with large scutellum, the antennæ are inserted far under the epistoma in very deeply excavated cavities in front of the eyes, the anterior margin of the head being arcuate continuously with the eye throughout the width, while in the genera with small scutellum, the epistomal edge is deeply sinuate laterally, and the points of antennal insertion more visible from above. In the structure of the sterna the two genera are identical. The posterior tarsi and tibial spurs are, however, slightly longer than in *Phalacrus*, but I cannot regard this as of such decisive importance as the two characters mentioned. The small foveæ near the eyes, visible in the genera with large scutellum, are generally obsolete in the others. From *Stilbus* this genus differs much more radically than it does from *Phalacrus*, in the very important structure of the mesosternum behind the middle coxæ.

In two characters *Olibrus* stands almost alone in the family, the one relating to the form of the terminal joint of the antennæ, the very strongly constricted terminal process so perfectly developed here being merely indicated in *Phalacrus*, and almost entirely obsolete in *Stilbus*, the other relating to the punctures of the elytral series, which are never transversely crescentiform, but if modified at all from fine simple points, distinctly attenuate posteriorly; this form of elytral punctuation I have not found to exist elsewhere, except in *Olibroporus*.¹ It is true there are many species of *Stilbus* which are perfectly devoid of the peculiar crescentiform punctures, but in this case the punctures simply disappear and never assume the elongate form here alluded to.

In the absence of the terminal line of robust setiform spinules at

¹ There is an undescribed South African species before me, in which the punctures at the sides become slightly dilated, but although it is apparently assignable to *Olibrus*, I am not entirely certain that it really belongs to that genus.

the apex of the prosternal process, *Olibrus* again resembles *Phalacrus* and differs correspondingly from *Stilbus*. In fact the resemblances of *Olibrus* to the latter genus must be regarded as in great part superficial.

Our species are very much less numerous than those of the European fauna, but the very limited number which we possess are more heterogeneous, and this opinion is strengthened by the characters assigned to the Central American forms by Dr. Sharp. Our species are in fact divisible into two groups of subgeneric importance, only one of which appears to be represented in the European fauna.

I.

Elytra with two discal striae.

Elytra maculate, vittate or differing in color from the pronotum.

Black, elytra with two oval rufous spots near the apex.....**LeContei**

Elytra paler, castaneous, each with a broad ill-defined flavate vitta; prothorax concolorous**vittatus**

Elytra pale, a suffused lateral, and a more distinct sutural, vitta blackish; head and pronotum piceous-black.....**nigricollis**

Elytra unicolorous.

Elytra without impressed lines accompanying the series of punctures; surface without trace of reticulation, perfectly polished throughout.

pallipes

Elytra with very finely, feebly impressed lines.

Impressed lines stronger and more evident; elytra polished, finely granulate-reticulate only at the immediate apex**semistriatus**

Impressed lines very feeble; elytral reticulation finer, more longitudinally aciculate, present at the sides and toward apex.

Form evenly elliptical, more convex, not attenuate behind; impressed lines almost obsolete**neglectus**

Form more narrowly oval, attenuate behind, less convex; impressed lines fine but somewhat distinct.....**rufipes**

II.

Elytra with a single discal stria.¹

Narrow, densely aciculate-reticulate.....**Wickhami**

O. LeContei n. sp.—Rather broadly oval, just perceptibly attenuate behind the middle, strongly convex, highly polished, black above, with a very clearly-defined elongate-oval spot of bright rufo-testaceous from the middle of each elytron nearly to the apex, approaching but not attaining the suture;

¹ *Olibrus bisignatus* Boh., of the Cape of Good Hope, also belongs in this group; it almost perfectly resembles *LeContei* in form and coloration, but is very densely reticulate-granulose throughout.

under surface, legs and antennæ pale rufo-testaceous. *Head* extremely finely and feebly punctate; antennæ moderately slender, third joint about as long as the next two together, club nearly as long as the six preceding joints combined, rather compact, nearly symmetrical, the eleventh joint as long as the two preceding together. *Prothorax* of the usual form, more than twice as wide as long, feebly lobed in the middle at base; basal bead apparently entirely obsolete; surface very minutely, sparsely and extremely feebly punctate. Scutellum ogival, one-half wider than long. *Elytra* about two and one-half times as long as the prothorax, very strongly rounded at apex, highly polished, without reticulation except the feeblest possible trace at the immediate apex, the sutural bead continuous nearly to the base, very fine; two discal striae distinct, nearly equal in length, vanishing at between one-third and one-fourth the length from the base, the first coincident with the suture at the extreme apex, the second approaching but not uniting with the first at posterior fourth or fifth; disk with rows of excessively fine feeble punctures, which become slightly more distinct at the sides, the series not accompanied by impressed lines. *Abdomen* minutely reticulate, coarsely pubescent. *Legs* moderate; posterior tibiae slender, subcylindrical toward apex; spurs distinct, the tarsi slender, fully three-fourths as long as the tibiae, with the first joint less than one-half as long as the second. Length 2.3 mm.

Atlantic States.

The metasternum is polished, not reticulate and not perceptibly punctate, the process rather short, strongly rounded at apex, the mesosternum widely visible at the sides of the apex, but reduced to a fine acutely elevated bead in the middle.

This species has heretofore been considered identical with the European *bicolor*, but specimens of the latter sent me by Reitter and confirmed as to their identity by the tables of Flach, show conclusively that it is very distinct. In the true *bicolor*, the elytra are reticulate at least as far as the middle, the metasternum is coarsely and deeply punctate, the form is much more elongate, the size is larger and the elytral spots more diffused. *LeContei* seems to coincide much more closely with the *lepidus* of M. Tournier's recently published table (L'Ent. Gen. I, p. 89), but is probably distinct, as the European species of this group seem to be uniformly more slender and attenuate behind, and have a large part of the elytra distinctly reticulate.

O. vittatus Lec.—Trans. Am. Ent. Soc., 1868, p. 50.—Evenly elliptical, or very feebly attenuate behind, about two-thirds longer than wide, strongly convex, highly polished, pale castaneous above, each elytron with a broad, very diffused median vitta of paler flavo-testaceous, more distinct toward base and not quite attaining the apex; under surface, legs and antennæ pale flavo-

testaceous. *Head* excessively finely, feebly and rather sparsely punctate; antennæ moderate, third joint not quite as long as the next two, club robust, compact, very strongly compressed, ninth joint slightly wider than long, ninth and tenth slightly more developed on the anterior side, nine to eleven increasing gradually in width, the latter fully as long as the two preceding, with the apical process well developed. *Prothorax* feebly lobed in the middle of the base; basal bead distinct in the middle; surface extremely sparsely minutely and feebly punctate. *Scutellum* wider than long, ogival. *Elytra* nearly three times as long as the prothorax; sutural bead very fine, disappearing at basal third; discal striæ fine but distinct, almost exactly as in *LeContei*; surface not reticulate, having rows of very fine punctures accompanied by the feeblest trace of fine impressed lines; alternate series more distinct, the intermediate series of finer punctures almost completely obsolete toward suture. *Abdomen* minutely and rather strongly reticulate and alutaceous except as usual along the apices of the segments, where it is polished, coarsely and rather sparsely pubescent, and subasperately punctate. *Legs* nearly as in *LeContei*. Length 2.2 mm.

New York.

The metasternum is polished, not perceptibly punctate, the few sparse hairs entirely filling the punctures, the process is broader than usual, broadly, evenly rounded at apex, projecting but slightly beyond the middle coxæ, the mesosternum being reduced to a very fine apical bead which is only slightly wider at the extreme sides of the apex.

The vittæ of the elytra are extremely diffused, and in some lights become almost invisible; the punctures of the elytra are rather more distinct than in *LeContei*, and the form is slightly more elongate-oval and less attenuate behind than in that species.

O. nigricollis Lec.—Trans. Am. Ent. Soc., 1868, p. 50.—Evenly, rather broadly elliptical, strongly convex, polished; head and pronotum blackish-piceous; elytra rufo-testaceous, the lateral margins narrowly, more feebly and indefinitely, and a broad, more definite and darker sutural, vitta piceous, the latter gradually attenuate from base to apex; under surface piceous-brown, the legs and antennæ flavate. *Head* strongly, sparsely punctate; eyes small. *Prothorax* more than twice as wide as long; basal lobe very broadly, feebly arcuate; basal bead fine, flat, strongly marked, obsolete at lateral fourth; disk very minutely, sparsely punctate, the punctures rather denser and more distinct laterally; marginal bead very fine; apical angles right, very narrowly rounded. *Scutellum* two-thirds wider than long; apex rounded; sides arcuate. *Elytra* about three times as long as the prothorax, not narrowed behind; apex very broadly rounded; sides coarctate with those of the prothorax; basal stria very fine, reflexed along the scutellum and obsolete opposite the apex of the latter; sutural bead very fine, attaining the apex of the scutellum; two discal striæ very fine but distinct, the first continuous from the suture at the apex and obsolete at basal fourth, the second approaching very near the first

at apical sixth or seventh, obsolete at basal third, sometimes also with traces of an incomplete third discal stria; disk polished, not reticulate except coarsely and confusedly so at the apex and thence slightly along the sides, having even distant rows of very minute punctures, the rows not attaining the base, the punctures coarser and confused near the sides and apex; intervals with uneven single rows of excessively minute feeble punctures. Metasternum polished, with scarcely perceptible sparse feeble punctures. Length 2.3-2.6 mm.

New Mexico (Las Vegas); Dakota (Bismarck).

Although the elytra are unmistakably vittate in this species, it cannot be considered a variety of *vittatus*; its large size, dark head and prothorax, much broader and more definite pale vittæ, coarser, denser and more rugose punctuation at the sides and apices of the elytra, and especially the more coarsely punctate head, preclude any such association.

The original unique type is immature, as there is no trace of the dark sutural stripe. The measurement given in the original description is too great.

O. pallipes Say.—Journ. Ac. Phil., IV, p. 90.—Evenly elliptical, very convex, highly polished, dark piceous-brown above; under surface, legs and antennæ pale, flavo-testaceous. *Head* sparsely and very obsoletely punctate; eyes rather small; antennæ rather robust, third joint almost as long as the next two combined, club rather robust, scarcely as long as the first three joints combined, ninth triangular, a little wider than long, tenth trapezoidal, twice as wide as long and distinctly wider and shorter than the ninth, eleventh as wide as the tenth, as long as the two preceding, but slightly wider than long, rather abruptly constricted at apical third forming a very distinct narrowly rounded apical process. *Prothorax* at base twice as wide as the head, a little more than twice as wide as long, slightly lobed and feebly beaded at the middle of the base, very obsoletely and finely punctate. *Scutellum* small, a little wider than long. *Elytra* two and one-half times as long as the prothorax, not narrowed behind, polished, not reticulate, with a fine transverse basal stria, reflexed slightly along the scutellum where it becomes obsolete; sutural bead wanting near the base, very fine thence to the apex; discal striæ two in number, the first extending to basal fourth, the second a little beyond the middle, the first uniting with the suture at the extreme apex, the second vanishing without attaining the suture at apical fourth or fifth; disk with distant rather regular rows of excessively fine feeble punctures, which become slightly more visible but still in regular series at the sides, almost obsolete at base, the rows not accompanied by impressed lines, the intervals excessively minutely feebly and obsoletely punctate in single irregular lines. *Abdomen* rather distinctly and subasperately punctate, plentifully but not densely pubescent. *Legs* moderate; posterior tibial spurs slender, rather long, the corresponding tarsi rather slender, densely pubescent beneath, two-thirds as long as the tibiæ, the

first joint less than one-third as long as the second, apparently subanched, second as long as the fifth exclusive of the basal node, which is unusually robust and well marked. Length 2.6 mm.

Kansas; Texas; Pennsylvania; New York.

The punctures of the elytral series are minute points, apparently absolutely non-setigerous. The metasternal process extends beyond the coxæ, and rests upon the inflexed prosternal process; it is strongly rounded at apex, very finely beaded throughout, and around the edges of the middle acetabula; its surface is polished, with a few excessively minute feeble and widely scattered setigerous punctures; the sides are slightly divergent from apex to base, at which latter point it is about three times as wide as the prosternal process, and as wide as the length of the last antennal joint. There is sometimes a very short isolated third elytral stria.

The species described by LeConte as *striatulus*, I believe to be the same as this, and the above description is taken from the original type of *striatulus*.

O. semistriatus Lec.—Proc. Ac. Phil., 1856, p. 16.—Rather narrowly and very evenly elliptical, strongly convex, highly polished, castaneous above, pale rufo-testaceous beneath; legs, trophi and antennæ concolorous. *Head* rather coarsely but not densely punctate; eyes moderate; antennæ moderate, third joint fully as long as the next two together, club rather robust, nearly as in *pulipes*. *Prothorax* twice as wide at base as at apex, distinctly lobed in the middle at base, the edge slightly sinuate opposite the scutellum; basal bead distinct, becoming obsolete at one-fourth the width from the sides; surface very sparsely, unevenly, feebly punctate, the punctures subelongate. *Scutellum* moderate, wider than long, rounded at the sides. *Elytra* three times as long as the prothorax, strongly, evenly rounded at apex, polished, without reticulation except very near the apex, not perceptibly so at the sides; sutural bead very fine, continuous to within a very short distance of the scutellum; first discal stria joining the suture at the apex, vanishing at less than one-third the length from the base; second distinct, obsolete at one-third the length from the base and one-fifth or one-sixth the length from the apex, approaching but not uniting with the first; basal stria continuous along the scutellum; disk with series of very fine feeble evidently elongate punctures, distinctly stronger at the sides, and accompanied by distinctly impressed lines which are continuous to the base. *Abdomen* moderately pubescent. *Legs* rather robust; posterior tibial spurs distinct, the corresponding tarsi three-fourths as long as the tibiae, with the first joint one-half as long as the second. Length 1.9–2.4 mm.

Kansas; Atlantic States.

The metasternum is polished, with very sparse fine pubescence, the punctures excessively minute and entirely filled by the hairs,

the process extending beyond the coxæ, strongly and narrowly rounded at apex, the mesosternum forming an apical border which is very fine in the middle but dilated at the sides and rather feebly declivous, so that it is readily visible in a perpendicular direction from below; it is moderate in width.

The description is taken from an eastern specimen which is much larger than the Kansas type, as the latter is in very bad condition. The species greatly resembles *pallipes*, but seems to be distinct.

O. neglectus n. sp.—Evenly and not very broadly elliptical, strongly convex, highly polished, black; under surface piceous-brown; legs, trophi and antennæ pale testaceous. Head finely but somewhat deeply densely and distinctly punctate; antennæ rather robust, third joint slightly shorter than the next two combined, club rather short, compact and robust, ninth joint triangular, wider than long, more pointed at the anterior side, tenth slightly shorter and wider than the ninth, much more than twice as wide as long, more pointed on the anterior side toward the apical angle, eleventh pyriform, slightly wider than the tenth, as long as the two preceding together. Prothorax of the usual form, feebly lobed in the middle at base, the lobe evenly, feebly arcuate; basal bead distinct, becoming obsolete at one-fourth the width from the sides; disk extremely minutely, feebly, sparsely punctate. Scutellum moderate, two-thirds wider than long, ogival; sides feebly arcuate; apex not rounded. Elytra two and one-half times as long as the prothorax, rather strongly rounded at apex, the sutural bead obsolete at nearly one-fourth the length from the base, excessively fine; discal striae very fine, the first continuing to within one-eighth the length of the base and joining the suture just before the apex, the second obsolete at two-fifths the length from the base and one-fourth from the apex, at this point approaching very close to, but not joining the first; surface with traces of very fine impressed lines, polished, but with feeble traces of minute reticulation, which becomes very evident at the apex and also along the sides; punctures of the series excessively fine and feeble, becoming but slightly more visible at the sides, rather distant in the rows, the intervals punctured in single series which are almost as regular as the principal series, but composed of smaller punctures; punctures not elongate and each with a very minute fine recumbent hair. Abdomen with coarse sparse pubescence. Legs rather slender; posterior tibiae slender, spurs distinct, the corresponding tarsi three-fourths as long as the tibiae, with the basal joint scarcely one-half as long as the second, the latter subequal to the fifth. Length 1.8 mm.

Vermont; New York.

The metasternum is polished and not distinctly punctate, having fine, very sparse pubescence, the process advancing but slightly beyond the coxæ, evenly rounded at apex, with the mesosternum as in *semistriatus*, but less exposed at the sides of the apex.

The basal stria of the elytra is very fine and is reflexed along the scutellum, rather distant from the latter and not extending beyond it.

O. rufipes Lec.—Proc. Ac. Phil., 1856, p. 16.—Rather narrowly oval, fully three-fourths longer than wide, rather distinctly attenuate behind from basal fourth of the elytra, polished, piceous-black above, testaceous beneath, the metasternum and abdomen clouded with piceous; legs and antennæ pale flavo-testaceous. *Head* finely but rather strongly and distinctly punctate; antennæ nearly as in *rittatus*. *Prothorax* more than twice as wide as long, with a broad distinct median lobe at base; basal bead distinct except toward the sides; surface finely but rather distinctly, sparsely and somewhat unevenly punctate, the punctures attenuate posteriorly. *Scutellum* ogival, one-half wider than long. *Elytra* three times as long as the prothorax; sutural bead very fine, becoming obsolete near the base; discal striæ fine but distinct, both becoming obsolete at basal third, the first coincident with the suture at the extreme apex, the second approaching but not joining the first at apical fourth or fifth; having also series of exceedingly minute simple punctures which are scarcely more distinct at the sides, the series accompanied by fine, feebly impressed lines which almost attain the basal stria; surface with very feeble, densely crowded, longitudinally aciculate reticulations, which are extremely minute, more distinct at the sides and especially at the apex, where they become more rounded and less aciculate. *Abdomen* sparsely pubescent, alutaceous. *Legs* moderate; posterior tarsi slender, three-fourths as long as the tibiæ, with the first joint about one-third as long as the second. Length 2.0 mm.

Oregon. Cal. LeConte.

The metasternum is polished, although finely reticulate, very sparsely, finely punctate and pubescent; the process is rather wide, projecting beyond the coxæ, with the apex broadly rounded, almost subtruncate in the middle, the mesosternum not distinct at the sides.

This species differs from the preceding in its broader, more obtusely rounded metasternal process, which is here about as wide as the anterior femur; in *neglectus* it is not much more than two-thirds as wide.

O. Wickhami n. sp.—Elongate-oval, nearly twice as long as wide, more or less attenuate from anterior third, black above, piceous beneath; trophi, antennæ, tibiæ and tarsi paler, rufo-testaceous; shining. *Head* very finely, sparsely punctate; antennæ moderate in length, rather slender, third joint as long as the next two together, club of nearly normal form but slightly less strongly compressed, slightly more parallel and less robust. *Prothorax* but slightly more than twice as wide as long; sides less arcuate than usual; basal lobe broadly arcuate; basal bead very feeble; surface polished, not at all reticulate, extremely minutely, feebly and sparsely punctate. *Scutellum* moderate, ogival, nearly twice as wide as long. *Elytra* three times as long as the prothorax; sutural bead very fine, not becoming entirely obsolete at the

base, the single discal stria very close to the suture, distinct, extending to basal third, coincident with the suture just before the apex: having rows of excessively minute, feeble, posteriorly attenuated punctures, attended by finely impressed lines which are continuous to the basal stria; entire surface covered with a dense system of short, closely crowded, longitudinally aciculate reticulations, which are strongly marked toward apex and the sides but sometimes very feeble or obsolete on the upper portions. *Abdomen* polished, without the usual minute reticulation, rather coarsely, asperately punctate, very coarsely pubescent. *Legs* normal, not very robust; posterior tarsi slender, three-fourths as long as the tibiae, with the basal joint about one-third as long as the second. Length 1.7-2.4 mm.

Southern California; Arizona; New Mexico.

The metasternum is excessively minutely, sparsely punctate, reticulate in wavy lines laterally; the process is rather wide, extending very slightly beyond the coxae, broadly rounded and finely beaded at apex, the mesosternum very narrowly visible and declivous at the sides in front of the coxae as usual. The third joint of the maxillary palpi is distinctly longer than wide, the fourth scarcely wider, elongate fusiform and nearly twice as long as the third.

In one specimen the discal stria does not quite attain the middle of the elytra, and in several other respects this species seems to be very variable. In the five typical representatives obtained by Mr. G. W. Dunn, in Southern California, or the northern part of Lower California, the form is generally very slightly narrower than the majority of a large series taken by Mr. H. F. Wickham, at various localities in Arizona and New Mexico, and the type has a distinctly longer development of the metasternal process than can be observed in the others, this process gradually shortening by insensible degrees, until in one of the broader forms from New Mexico, the mesosternum instead of being deeply excavated under the apex of the process, is simply strongly declivous. There is also marked variation in the width of the process and its degree of obtuseness, in some specimens being very broadly rounded and in others very narrowly so, in the latter case leaving much more of the declivous mesosternum visible at the sides of the apex.

The dense aciculate-reticulate sculpture, which is unique, and the single discal stria, taken in connection with the sternal and tarsal characters of *Olibrus*, show that this species is an isolated and highly specialized form, without any near congeners—although in *rufipes* there is a feeble indication of the sculpture here so highly developed;—and for this reason, as well as the fact that there appears to be no

stability in the variations observed, it is impossible to specifically divide the large amount of material before me.

OLIBROPORUS n. gen.

Base of the antennæ entirely exposed in deep frontal emarginations, just before the eyes. Scutellum small. Elytra with a single discal stria, the sutural bead completely wanting. Prosternal process rather narrow, abruptly inflexed at apex, the latter not setose. Mesosternum forming a minute bead along the apex of the very broad, transversely truncate metasternal process, the latter not advancing beyond the coxæ, the mesosternum not developed behind the middle acetabula, forming merely a beaded margin. Legs short and robust; terminal spurs of posterior tibiæ small, slender, slightly unequal; posterior tarsi moderate, cylindrical; basal joint obliquely truncate and prolonged beneath the second, the articulation rigid; second joint moderate in length, scarcely twice as long as the first.

These few words will serve to characterize a genus intermediate in some characters between *Stilbus* and *Olibrus*, and combining also several of the structural features of other genera. The apex of the prosternal process is more abruptly inflexed than is usual in *Olibrus*, but the edge is not as free and acute as in *Stilbus*.

O. punctatus n. sp.—Rather broadly, evenly elliptical, convex, strongly shining, black above, rufo-testaceous throughout beneath; antennæ same. Head short, very minutely, rather feebly punctate; eyes large, not margined internally; antennæ moderate, third joint nearly as long as the next two, club large, longer than the funicle, elongate-elliptical, strongly compressed, the eleventh joint but slightly longer than wide, one-half longer than the tenth, the terminal process not well defined and obtusely rounded. Prothorax very short, almost three times as wide as long, strongly narrowed from base to apex; sides arcuate and continuous in curvature with those of the elytra; basal lobe almost obsolete; basal bead fine, very strong and continuing to within a very short distance of the basal angles, the posterior margin of the basal bead finely granulato-aciculate; disk very minutely, feebly and not very densely punctate, the punctures rather larger and denser near the lateral edges; the latter margined with a broad flattened bead which becomes very wide around the apical angles. Scutellum very small, slightly wider than long, pointed; sides broadly arcuate. Elytra more than three times as long as the prothorax, not narrowed toward apex, the latter very broadly, evenly rounded; transverse basal stria fine, deeply impressed, abruptly ending at the base of the scutellum, which it attains, but at which point it is not in the least reflexed; anterior half of the basal bead—formed by the basal stria—longitudinally granulato-aciculate; discal stria very deeply impressed, coincident with the suture at the apex, and very gradually evanescent at basal fourth, becoming an unimpressed row of punctures; disk rather coarsely reticulate in transverse wavy lines,

having nine very even rows of large, rather closely placed, deeply impressed and slightly elongate punctures, which are equal in size throughout the width, and not in the least dilated laterally, the rows almost attaining the base and not accompanied by impressed lines; intervals flat, with uneven single rows of fine punctures. Metasternum shining, very finely, sparsely, subasperately punctate, coarsely and sparsely pubescent. Length 1.9 mm.

* Florida.

The widely spaced, perfectly even rows of deeply impressed punctures, distinguish this species from any other of the family, but recall to a considerable degree the punctuation of *Phalacrus seriatus*; in the latter, however, the series of the intervals are as distinct as the others, so that the regular rows are twice as numerous as in the species here described. The general character of these punctures is perfectly similar to the prevailing type in *Olibrus*.

EULITRUS Sharp.

Head extremely minutely but distinctly and not very sparsely punctate, with several larger, widely dispersed punctures toward the sides of the front. Epistoma transversely, feebly arcuate; sides widely divergent posteriorly, the antennal sinuations feeble, a very small portion of the basal joint concealed. Antennæ rather long; basal joint large, much longer and more robust than the second; third scarcely as long as the next two combined; outer joints of funicle slightly more robust, the eighth wider than long; club long, loose; ninth and tenth joints triangular, subequal in length, ninth to eleventh much more developed on their anterior sides, the last much shorter than the two preceding together. Ligula short and very broad, the paraglossæ corneous, connate, pointed at the sides, extending laterally beyond the subquadrate mentum. Palpi robust; last joint of the labial slightly swollen, as long as the two preceding; fourth joint of the maxillary subcylindrical, obtusely pointed, as long as the two preceding together. Prosternal process inflexed at apex, not at all setose, moderate in width. Metasternal process very wide and long, extending beyond the coxæ and resting in repose upon the prosternal process which is feebly impressed, strongly evenly rounded at apex. Mesosternum forming a fine beaded margin along the apex and coxal cavities, and expanded behind the latter, becoming here about three times as wide. Legs moderately robust; tibial spurs long, strong, unequal; posterior tarsi rather long, cylindrical; basal joint short, almost rigidly ankylosed to the second, and not extending beneath it; second joint extremely long, nearly four times as long as the first and about one-half longer than the entire remainder, not very densely clothed throughout with short robust closely recumbent spinose setæ; fourth joint very distinct as a basal node of the last; third not in the least dilated, obliquely lobed beneath.

In addition to the above characters, it should be mentioned that the elytra are entirely destitute of any trace of discal striae, although

the suture is very finely beaded, the bead becoming obsolete before attaining the base. The scutellum is small, and the elytra are rendered feebly opalescent by an excessively minute transverse strigilation, which is just resolvable under a power of 80. The punctures are small, feebly crescentiform and disposed in rather approximate but not very regular rows, becoming wider and more confused near the sides.

The description is taken from the typical Central American *E. estriatus* Sharp, one of the largest and finest species of the family.

The affinities of *Eulitrus* are evidently strongly toward *Olibrus*, and it bears very much the same relation to that genus that *Acylo-*
mus bears to *Stilbus*. The feeble dilatation of the mesosternum behind the middle acetabula, shows also that it should form one of a series joining *Olibrus* and *Acylo-*
mus or *Stilbus*. No species has yet been discovered within the United States.

LITOLIBRUS Sharp.

The nearest ally to this genus is probably *Acylo-*
mus, from which it differs primarily in four important characters as follows:—

1. The mesosternum is not produced at all behind the middle acetabula, being reduced to a simple fine bead forming the margin of the cavity, as in *Olibrus*.

2. The metasternal process is very narrow and much shorter.

3. The sexual modification of the posterior tibiae, tibial spurs, and tarsi does not apparently exist, and the second joint in the male is not spongiose beneath.

4. The basal joint of the posterior tarsi is extremely obliquely truncate at apex, and extends more or less beneath the second joint, this being more noticeable in the northern forms than in the typical *obesus* where, however, it is also very marked. In *Acylo-*
mus the apex of the first joint is only slightly oblique, and its lower surface does not extend at all beneath the second. In both genera the connection between these joints is rigid, apparently admitting of but little, if any motion, but the line of demarcation is rather stronger in *Litolibrus* than in *Acylo-*
mus.

Both of the genera here compared differ greatly from *Stilbus* in the very elongate second joint, and *Litolibrus* differs from *Acylo-*
mus as well as *Stilbus* in its extremely robust legs, especially the middle and posterior femora and tibiae.

This genus is one of the most distinct of the family, ranking, in

the radical nature of its peculiarities of structure, with either *Olibrus* or *Stilbus*; it is essentially tropical, but extends into the southern limits of the United States, where it is represented by two species characterized as follows:—

Pale testaceous; elytra black, with the margins and two oval approximate spots just before the middle pale.....**princeps**
 Pale ochreous-flavate throughout.....**uniformis**

L. princeps Schwarz.—Proc. Am. Phil. Soc., XVII, p. 361.—Rather broadly, evenly elliptical, moderately convex, polished; head, pronotum, a large oblique oval spot on each elytron before the middle, attaining the suture, the lateral margin and apex narrowly, entire under surface, legs and antennæ pale rufo-testaceous; remainder of the elytra black. *Head* polished, somewhat coarsely, sparsely and feebly punctate; eyes large, their inner margin slightly elevated above the general surface of the vertex; epistoma without a beaded margin, except laterally along the antennal sinuations; antennæ rather long and robust, joints three to five decreasing uniformly and very slightly in length, outer joints of funicle slightly more robust, seventh and eighth equal in length, the latter just visibly wider than long, club rather robust, strongly asymmetric, the anterior sides much more strongly angulate, and the eleventh joint slightly lobed on this side near the base, longer than the two preceding together. *Prothorax* much more than twice as wide as long, not reticulate, very minutely and obsoletely, but somewhat densely punctate; basal lobe moderate, broadly, evenly arcuate, the basal bead fine, very strong, extending laterally to within one-fourth the width of the sides, with its posterior margin finely and very strongly granulose. Scutellum equilatero-triangular, small, the sides very feebly arcuate. *Elytra* polished, the transverse strigilation so minute as to be merely suggested by a very feeble opalescence under high power, having rows of very small, rounded punctures which are larger, deeper and more distinct at the sides, always crescentiform, the intervals with an obscurely double line of nearly similar punctures; discal stria obsolete at basal third. *Abdomen* coarsely, sparsely pubescent. *Legs* short and very stout, the posterior tibiæ short, obliquely truncate at apex, the truncation sinuate; spurs very long, stout, and distinctly unequal, the corresponding tarsi nearly as long as the tibiæ, the first joint short above, very strongly produced beneath the second; second joint arcuate above near the base, more than four times as long as the upper or shorter side of the basal joint, and very much longer than the entire remainder. Length 2.6 mm.

Florida. Mr. Schwarz.

The metasternal process is narrow and very short, flat, impunctate, truncate at apex, the mesosternum in front of it abruptly declivous, and extending laterally so as to slightly envelop the middle coxæ, having one or two robust setæ at the sides near the coxæ and metasternum, not at all prominent; prosternal process moderate, with two or three very fine feebly developed setæ.

This is an extremely distinct species in many characters, especially those of the antennæ, mesosternum and posterior tarsi, but it does not differ generically from *L. obesus*. The species described as *varians* by Dr. Sharp (Biol. Cent.-Amer. Col., II, i, p. 260), does not appear to differ specifically, and, in accordance with the theory of distribution by ocean currents from Central America to Florida, formerly held by Dr. LeConte (Proc. Am. Phil. Soc., XVII, p. 471), and more recently demonstrated by Mr. Schwarz (Proc. Ent. Soc. Wash., I, p. 145), the proposed synonymy is rendered highly probable.

L. uniformis n. sp.—Somewhat broadly, evenly oval, very strongly convex, pale ochreous-flavate throughout, strongly shining. *Head* not reticulate, extremely minutely, obsoletely and sparsely punctate, with a few scattered punctures of larger size near the eyes; the latter moderate, the inner margin and beaded edge of the epistoma as in *princeps*; antennæ moderate, funicle slender, third joint much shorter than the next two combined, fourth slightly shorter than the fifth, eighth very slightly shorter than the seventh, a little wider than long, club robust, fusiform, nearly symmetrical, eleventh joint fully as long as the two preceding combined. *Prothorax* distinctly more than twice as wide as long; basal lobe very broad and extremely feeble, the bead fine but strong, continuing laterally to within one-fifth the width of the sides, with the posterior margin finely and strongly granulose; surface polished and almost completely devoid of punctuation. *Scutellum* equilatero-triangular, the sides feebly arcuate. *Elytra* distinctly opalescent, having widely distant rows of moderate punctures, which are more deeply impressed and very distinct toward the suture, and more broadly crescentiform but rather more feebly impressed near the sides and apex, obsolete toward base; intervals with a few widely dispersed, excessively minute punctures; sutural stria distinct, obsolete at basal third or fourth, the transverse strigulation excessively minute and dense, not resolvable under high power. *Abdomen* reticulate, sparsely pubescent, the rows of robust setæ at the apices of the segments especially prominent. *Legs* short and very stout; obliquity of truncation of the posterior tibiæ rather slight, the spurs long and strong, the tarsi rather slender, more symmetrical than in *princeps*, the basal joint less strongly produced beneath the second, the latter seven or eight times as long as the first on the upper side, and slightly more than twice as long on the lower side, sparsely clothed with very short recumbent setæ, and much longer than the entire remainder. Length 2.4 mm.

Texas.

The metasternal process is very narrow, short, truncate at apex, the mesosternum before it moderately declivous, not at all prominent, and not much dilated over the coxæ at the sides; prosternal process narrow, very strongly dilated at apex, where it is between

two and three times as wide as at the narrowest part, the apical margin bearing two short stiff setæ.

This species appears to be distinct from any of those recently described by Dr. Sharp; *minor*, which undoubtedly resembles it in color and size, has the club of the antennæ short and broad, and "developed on one side only of the mesial line."

ACYLOMUS Sharp.

Although bearing a certain general resemblance to *Stilbus*, this genus possesses two characters which render it one of the most remarkable of the entire family.

The first character is not entirely peculiar, as it reappears to a less marked degree in *Litochropus*; it relates to sexual modifications affecting the posterior tibiæ. In the males these increase strongly in width from base to apex; they are obliquely truncate, and have the terminal spurs extremely unequal, the smaller being longer than usual in *Stilbus*, and the other greatly developed, being sometimes between one-third and one-fourth as long as the entire tibia, and generally slightly contorted toward apex. In the female the tibiæ are normally and sometimes unusually slender, transversely truncate, and have the terminal spurs of the usual form, although much longer, stouter and more unequal than in *Stilbus*.

The other character relates to the vestiture of the under surface of the second joint of the posterior tarsi, which, in the males, is of a densely spongiose nature, similar to the under surface of the anterior tarsi in the males of *Anisodactylus*. This character seems to be absolutely peculiar to *Acylopus*, and is most highly developed in the typical *A. aciculatus* Sharp.

In the genus *Acylopus* the second joint of the posterior tarsi is very much more elongate than in *Stilbus*, and the basal joint correspondingly abbreviated, the connection between the two being more rigid. The structure of the mesosternum is nearly similar, but its extension behind the middle coxæ generally less, being intermediate in this respect between *Stilbus* and *Litolibrus*; it is also a connecting link between these two genera in the sculpture of the elytra, the reticulation of the surface when present in *Stilbus* being coarser and tending less to a transverse arrangement in wavy lines, while in *Litolibrus* it is very much finer, taking the form of a more regular transverse strigilation, of such excessive minuteness and close-

ness that it cannot be distinctly resolved by the highest ordinary working powers of the microscope; it is to this natural optical diffraction-grating, that the opalescence observable in most of the species is due; the same effect from a similar cause is more familiar to us, and even more strongly developed, in *Selenophorus* of the Harpalini.

The elytral punctures prevailing in the genus are very strongly transversely crescentiform, being much more highly developed than even the most extreme cases which I have observed in *Stilbus*; this character is also very marked in the *Litochride* genera. The setæ at the apex of the prosternal process are less highly developed than in *Stilbus*, being generally shorter and sometimes reduced in number to two, situated at the apical angles. The metasternal process is generally rather longer than in *Stilbus*, somewhat variable in width, and is usually slightly dilated at the immediate apex, the tumid mesosternum before it being almost invariably shorter.

The species are probably moderately numerous in the United States; the five which I have before me may be separated as follows:—

Color throughout the upper surface piceous or black.

Form evenly elliptical or suboblong, not at all attenuate behind.

Piceous, the crescentiform punctures of the series toward the suture wide and strongly developed; transverse strigilation somewhat coarser; form more feebly convex.

Setæ at the apex of the prosternal process uniformly two in number.

calcaratus

Setæ more robust, four or five in number; form of body much more elongate**extricatus**

Intense black, the punctures of the series toward the suture very fine and feeble; transverse strigilation very much finer; form more convex.

ergoti

Form broadly oval, distinctly attenuate behind from the base of the elytra, pale piceous, the elytra very minutely strigilate**piceus**

Color castaneous, the head, pronotum, apex of the elytra, and two discal spots near the base of the latter pale rufo-testaceous.....**nebulosus**

A. calcaratus n. sp.—Almost evenly oval, more broadly so and less convex in the male; piceous above, under surface, legs and antennæ pale flavo-testaceous; lustre subalutaceous. *Head* extremely minutely, rather sparsely punctate, polished, not distinctly reticulate; eyes large; antennæ moderate in length, rather slender, third joint slightly shorter than the next two together, fourth much shorter than the fifth, outer joints of funicle just visibly stouter, seventh a little longer than the eighth, the latter rather longer

than wide, club rather slender, symmetrical, ninth joint longer than wide, longer than the tenth, the latter slightly transverse, eleventh nearly as long as the two preceding together. *Prothorax* more than twice as wide as long, distinctly, broadly lobed at the middle of the base, and finely but distinctly beaded; surface excessively minutely, sparsely punctate, polished toward apex, very minutely strigilate in wavy transverse lines which are distinct toward base and obsolete toward apex. Scutellum ogival, nearly as long as wide. *Elytra* finely and very distinctly strigilate in transverse wavy lines throughout, having rows of broadly crescentiform, feebly impressed punctures, which are but slightly wider at the sides, where they are more approximate laterally, and becoming obsolete near the base; discal stria distinct, obsolete at basal two-fifths. *Abdomen* coarsely, sparsely pubescent, shining, coarsely reticulate. *Legs* moderate, the posterior femora not unusually robust; tibiae feebly dilated from base to apex, the apical truncation slightly oblique, very sparsely setose, having an internal and external line of fine erect setiform spines, the terminal spurs extremely unequal, the larger feebly contorted, as long as the apical width of the tibia; corresponding tarsi very slender, cylindrical, with the second joint nearly four times as long as the first, and longer than the entire remainder, the under surface spongy-pubescent only in the apical half. Length 1.4–1.7 mm.

Texas (Galveston and Austin).

The description is taken from the male; the female has the posterior tibiae nearly equal in width throughout, and rather slender, the terminal spurs smaller and more slender, but decidedly unequal, the longer one being still as long as the apical width; the tarsi are more slender, with the second joint rather shorter and not spongiose beneath.

The metasternum is very minutely, sparsely punctate, very sparsely pubescent, the process very wide, rather long, slightly and abruptly dilated at the immediate apex, the mesosternum in front of it transverse and very short, not distinctly tumid, the prosternal process rather wide, the free apex very feebly, broadly arcuate, and having but two short spinose setae—one at each angle.

A. extricatus n. sp.—Elongate, evenly elliptical, nearly twice as long as wide, piceous above, dark rufo-testaceous throughout beneath; elytra sub-alutaceous. *Head* very strongly retractile; antennae moderate, outer joints of funicle slightly robust, club very distinctly increasing in width from base to apex, ninth joint scarcely longer than the tenth, the eleventh as long as the two preceding together. *Prothorax* but slightly more than twice as wide as long, very broadly, strongly lobed in the middle of the base, the beaded margin distinct; surface polished, very minutely, transversely strigilate in wavy lines which are very distinct toward base and nearly obsolete toward apex. Scutellum very small, ogival, slightly wider than long, the sides strongly arcuate.

Elytra more than three times as long as the prothorax, having rows of moderate crescentiform punctures which, at the sides, become very strongly transverse, sometimes confluent, and more or less confused in arrangement; intervals toward the suture each with a row of similar punctures, but about one-half as wide; discal stria distinct, obsolete at basal third; surface rather coarsely strigilate in wavy transverse rows throughout. *Abdomen* nearly as in *calcaratus*. *Legs* moderate. Length 1.8 mm.

Texas.

This species is closely related to *calcaratus*, but differs in its much more elongate, slightly less convex form. It is described from the female, and the posterior tibial spurs are rather less developed and less unequal than in the corresponding sex of *calcaratus*; the tarsi are nearly similar in structure. In *calcaratus* the apex of the prosternal process has, without exception, only two terminal setæ, while in the present species there is a row of four or five which are longer, and nearly twice as stout; this constitutes one of the most decisive points of difference between these species. The head is so far retracted within the prothorax in the type as to be invisible from above.

A. ergoti n. sp. (Walsh MS.)—Strongly convex, almost evenly elliptical, one-half to two-thirds longer than wide, the male slightly the shorter, black above, pale flavo-testaceous throughout beneath; lustre strongly shining. *Head* very minutely, sparsely punctate, polished, not reticulate; eyes rather large; antennæ nearly as in *calcaratus*, but with the outer joints rather more robust, and the club more strongly narrowed from apex to base. *Prothorax* polished throughout, toward base excessively obsoletely transversely strigilate in wavy lines, the punctures extremely minute and sparse; basal lobe and beaded margin distinct, the latter not extending laterally further than the lobe. *Scutellum* equilatero-triangular, with the sides very feebly arcuate. *Elytra* sub-alutaceous, very minutely, transversely strigilate in wavy lines, having rows of punctures which, toward the suture, are very minute and feeble, and toward the sides slightly larger, always transversely crescentiform; discal stria distinct, obsolete at basal two-fifths. *Abdomen* coarsely reticulate, moderately shining, coarsely, sparsely pubescent. *Legs* moderate; posterior tibiæ increasing very rapidly in width from base to apex, very obliquely truncate; spurs nearly as in *calcaratus*; tarsi very long and slender, three-fourths as long as the tibiæ, with the second joint between three and four times as long as the basal, and spongiose throughout beneath, except at the immediate base. Length 1.8–2.2 mm.

Pennsylvania; Delaware; Iowa; Texas.

The description is drawn from one of the Iowan males; the female is larger, rather more convex, and has the posterior tibiæ

more slender, the spurs being smaller and less unequal than in the female of *calcaratus*, the longer one much shorter than the apical width of the tibia.

The sternal structure is nearly the same as in *calcaratus*, but the metasternal process is rather less broad, and the mesosternum is more developed behind the middle acetabula. The terminal setæ of the prosternal process are about three in number, extremely short, being much shorter than in *calcaratus*.

This species is widely distributed, and differs from the preceding in its larger size, black color, more convex form, finer elytral sculpture and punctuation, more especially in the rows toward the suture, and, more decidedly, in the greater dilatation and obliquity of truncation of the posterior tibiæ in the male. It varies considerably in size.

A. piceus n. sp.—Broadly oval, rather pale fusco-piceous above, very pale brownish-flavate throughout beneath, polished, the elytra feebly alutaceous, moderately convex; sides feebly convergent behind from the base of the elytra. *Head* not reticulate, extremely finely and feebly punctate; eyes moderate; apical margin of the front with two minute foveæ on each side just above the insertion of the antennæ, the latter rather slender, the third joint distinctly shorter than the next two together; club elongate, very slender, symmetrical, parallel and rather loose; ninth joint slightly longer than wide and a little longer than the tenth, the latter nearly as long as wide and not wider than the ninth, the eleventh elongate, nearly as long as the two preceding, obtusely rounded at the apex, without trace of terminal process. *Prothorax* between two and three times as wide as long, very strongly narrowed from base to apex; basal lobe very feeble, the bead strong but very short, not extending laterally beyond the lobe; disk with feeble traces of transverse reticulation toward base; punctures almost obsolete. *Scutellum* scarcely wider than long, ogival, with the sides slightly arcuate. *Elytra* rather short, about two and one-half times as long as the prothorax, evenly and not very broadly rounded at apex; surface very minutely and rather strongly transversely strigilate in wavy lines throughout, except near the base, where the sculpture becomes very feeble, having series of small transversely crescentiform punctures, which are feebly impressed and which are not much wider or more distinct toward the sides, the series accompanied by fine feebly impressed lines, the intervals with uneven series of excessively minute feeble punctures of the same nature; all the punctures becoming gradually obsolete in basal third; discal stria fine but distinct, obsolete at basal third. Length 1.9 mm.

District of Columbia. Mr. Ulke.

The description is drawn from the male, the posterior tibiæ being gradually strongly dilated from base to apex and very obliquely truncate, the spurs long and very unequal, the posterior tarsi long

and extremely slender. The metasternal process is rather narrower than usual in this genus.

A. nebulosus n. sp.—Very broadly oval and moderately convex, about one half longer than wide; elytra feebly attenuate from base to near the apex, then conjointly evenly rounded, subalutaceous, castaneous; head, pronotum, each elytron obliquely at apex, and a small indefinite spot at the base of each elytron, nearer the humerus than the scutellum, paler, rufo-testaceous; under surface, legs and antennæ very pale testaceous. Head extremely minutely, sparsely punctate, not reticulate; eyes moderate; antennæ slender, joints one to eight elongate, club moderate, the eleventh joint about as long as the two preceding together. Prothorax distinctly more than twice as wide as long; basal lobe very broad, feeble, transverse opposite the scutellum; bead fine but rather distinct, not extending laterally beyond the lobe; surface polished, extremely minutely and obsoletely punctate, very feebly strigilate in wavy transverse lines which become almost obsolete toward apex. Scutellum ogival, slightly wider than long. Elytra strongly and distinctly, but very minutely strigilate-reticulate in broken transverse wavy lines throughout, alutaceous in lustre, having series of very small feeble crescentiform punctures which become larger laterally, and rather confused near the sides; intervals each with a very irregular line of similar though extremely fine punctures; discal stria fine but distinct, obsolete at basal fourth. Abdomen reticulate, very sparsely pubescent. Legs moderate, the posterior femora not unusually robust. Length 2.2 mm.

California (Fort Yuma).

The posterior tibiæ are but slightly more robust and dilated in the male, the terminal spurs in that sex being extremely unequal, the longer nearly three times as long as the shorter, and rather longer than the apical width, the corresponding tarsi being rather robust, the second joint nearly four times as long as the first, and slightly longer than the entire remainder, spongiose along the middle beneath throughout the length, the spongiose area being limited laterally, as usual, by two lines of long, very closely-placed and slender setæ; first joint not at all produced beneath the second, the attachment apparently rigid. In the female the spurs are smaller and more nearly equal, the larger but twice as long as the smaller, the tarsi more slender, especially the second joint which is not spongiose beneath.

The metasternal process is very broad, and the sternal structure in general very similar to that of the typical forms.

The setæ at the apex of the prosternal process appear to be normally three in number, but the middle one is occasionally absent, and there may sometimes be one which is superfluous and sporadic. In

the female they are more than twice as long and stout as in the male, being extremely minute in the latter sex.

The discovery of this peculiar secondary sexual character proves that these terminal setæ play a more important part in the economy of the insect than has been hitherto supposed, and that the gap separating those genera possessing them from those in which they are wanting, as for instance *Stilbus* and *Olibrus*, is even correspondingly greater. It also indicates that any classification of the species in genera possessing these setæ, based in any way upon them, must be used with more or less caution. It is only fair to state, however, that I have not been able to discover similar sexual variation in *Stilbus*, where I have separated several species because of the abnormal shortness of these setæ, and in this particular case it is of very little consequence, as the four species constituting the second group are so distinct in other characters that they can be easily identified, and after all this is the main object of taxonomical tables in such preliminary and superficial studies as the present is necessarily forced to be.

The terminal setæ in *A. calcaratus* also differ sexually, but only to a slight degree, being a little longer in the female; they are, in that species, very persistently two in number.

Besides being aberrant in this way, the present species differs greatly in coloration from the others, reminding us somewhat, but in facies only, of *Stilbus viduus*. It also appears to resemble the Central American *Olibrus submaculatus* Sharp, especially in coloration, but the sculpture and punctuation seem to be much more pronounced and evident than in that species.

LIOPHALACRUS Sharp.

The single specimen of the typical *L. bicolor* before me is in a very imperfect state, so that I cannot examine the mouth-parts or antennæ; otherwise it is extremely closely allied to *Stilbus*, and differs only in the structure of the posterior tarsi, which are comparatively short and slender, cylindrical, with the proportional length of the joints as in *Stilbus*, but with the first joint rigidly anchylosed to the second. The second joint is not remarkably long, and not quite twice as long as the first, the third being slightly dilated and deeply emarginate above. In *Stilbus* the articulation

between the first and second joints is much less rigid and the motion apparently perfectly free.

In *L. bicolor* the metasternal process is wide, strongly rounded throughout at apex, and does not extend to the anterior limits of the coxæ; the mesosternum in front of it forms a perfectly flat transverse piece, rather long, projecting beyond the coxæ, with the apex transversely truncate, and the surface bearing a transversely arcuate row of robust recumbent spinose setæ, projecting posteriorly, the line of demarcation between it and the mesosternum extremely fine. Behind the middle acetabula the mesosternum is very strongly developed, the piece being posteriorly produced in a slender cusp, extending almost to within one-third the length of the metasternum of the posterior margin of the latter. The prosternal process is rather wide, the posterior edge being free, acute, transversely truncate, and bearing a series of four or five erect robust and prominent spinose setæ.

On the upper surface the sutural bead is entirely obsolete, and the single discal stria fine, close to the suture, and rather short. The sculpture consists of very fine transverse strigilation which, however, is not sufficiently fine and close to produce an opalescent lustre. The punctures throughout are extremely minute and feeble, not transversely crescentiform, and not more distinct at the sides, in this respect being exactly similar to many species of *Stilbus*.

No species of this Central American genus has yet occurred within the United States.

STILBUS Seid.

*Olistherus*¹ Seid.;—*Eustilbus*² Sharp.

Some of the structural characters distinguishing this genus have been before indicated, and it is only necessary to state in general that it differs from *Olibrus* in its short metasternal process, prominent and tumid mesosternum, extension of the latter behind the middle acetabula, in the form of the prosternal process which is here furnished with a distinct free edge posteriorly, and armed with a transverse series of stout setiform spinules, in the absence of a bead along the elytral suture, in the form of the eleventh joint of the

¹ This is not, properly speaking, a pre-occupied name, *Olistherus* being to some extent different from *Olisthærus*.

² Biol. Cent.-Amer., II, Pt. 1, p. 253.

antennæ which is not constricted in apical third, and in the form of the fourth joint of the maxillary palpi which is distinctly more robust and securiform.

It resembles *Olibrus* in the mode of antennal insertion, but differs radically in this respect from *Phalacrus*. Its relationship with *Acydomus* and *Litolibrus* has been mentioned under those genera.

The posterior tibial spurs are generally very small, slender and subequal, and in some species become quite as insignificant as in *Phalacrus*. The basal joints of the posterior tarsi are simply densely setose beneath, the second joint being but moderately elongate, generally nearly twice as long as the first, but in *nitidus* relatively shorter and but slightly longer than the first. The sculpture varies from the completely polished, as seen in *apicalis*, to a rather coarse and very strong reticulation throughout the upper surface, as seen in *subalutaceus*. The punctures are generally very minute and obscure, sometimes almost completely obsolete, the broadly crescentiform type being rare and exceptional. In *pusillus*, *modestus*, *attenuatus*, and *elongatulus*, the punctures become deeper and more distinct on certain limited portions of the elytral disk.

Our species are moderately abundant, usually widely distributed, and are somewhat diversified in structure. The four species assigned to group II, differ each very greatly from those of group I, in several peculiarities of structure or sculpture, but at the same time differ from each other to quite as great a degree. In general, the reticulation of the elytral surface, when present, is relatively somewhat coarse, and does not exhibit the transversely wavy lines so perfectly as in *Acydomus*; in *convergens* and *attenuatus* it is replaced by a very minute wavy strigilation which, however, is not sufficiently fine to produce an opalescent effect as in *Litolibrus*.

The following table will probably enable the student to recognize those species which I have been able to study:—

Spinules at the apex of the prosternal process long and conspicuous.....I

Punctures of the second and third elytral series not more distinct in the middle.

Elytra either entirely pale or very distinctly paler at the apex.

Elytra highly polished, not reticulate except sometimes very feebly toward apex; punctures excessively minute and scarcely visible.

Elytra paler at apex.

Form narrowly oval, piceous, each elytron abruptly and obliquely paler at apex.....***apicalis***

- Form broadly oval, color pale castaneous; pale area at apex not well defined **viduus**
- Elytra entirely pale..... **pallidus**
- Elytra reticulate throughout.
- Very small, strongly convex, the elytra acutely rounded behind; punctures obsolete; color pale throughout **nitidus**
- Larger, more depressed.
- Pale reddish-flavate throughout; punctures of the elytral series distinct, at least toward the suture..... **aquatilis**
- Dark piceous-brown, the apex abruptly paler; punctures obsolete, **floridanus**
- Elytra piceous or piceous-black throughout.
- Elytra finely reticulate throughout, larger species, moderate in size.
- Eighth joint of antennæ elongate..... **obscurus**
- Eighth joint slightly transverse, and much shorter than the seventh. **obtusus**
- Elytra highly polished, not reticulate; very minute species. **nanulus**
- Punctures of the second and third series from the discal stria composed of punctures which are large, deep and distinct in the middle third, but obsolete toward base and apex.
- Lateral series composed of very minute, nearly obsolete punctures. **pusillus**
- Lateral series composed of widely dilated, crescentiform punctures. **modestus**
- Spinules at the apex of the prosternal process short **II**
- Discal stria very short and feeble, not extending beyond the middle; body evenly elliptical, piceous-black, strongly reticulate **subalutaceus**
- Discal stria normal, obsolete at basal third; body attenuate behind from the base of the elytra.
- Elytra very minutely, transversely strigilate; color pale testaceous throughout.
- Punctures very feeble; metasternal process very wide, the mesosternum in front of it short, transverse and tumid **convergens**
- Punctures distinct and rather distant; metasternal process narrow, shorter, the mesosternum before it long, rather narrow and flat. **attenuatus**
- Elytra more coarsely reticulate in transverse wavy lines; color intense black above; punctures of the series rather close and very deeply impressed throughout the width..... **elongatulus**
- S. apicalis** Melsh.—Proc. Ac. Phil., II, p. 102.—Oval, strongly convex, very feebly attenuate behind the middle, about two-thirds longer than wide, highly polished, piceous-black; apex rather abruptly pale testaceous, the general blackish tint being prolonged along the suture nearer the apex; under surface rufo-testaceous; legs, antennæ and trophi paler and more flavate. Head polished, excessively minutely, feebly and very sparsely punc-

tate; antennæ slender, third joint not as long as the next two combined, seventh longer than wide, eighth shorter, slightly wider, slightly trapezoidal, a little longer than wide, club elongate, slender, compact and parallel; ninth joint obconical, slightly longer than wide, longer than the tenth, and two-thirds as long as the eleventh, the latter oval, three-fourths longer than wide, not constricted, narrowly rounded at apex. *Prothorax* slightly more than twice as wide as long, length equal to apical width; basal lobe very feeble; basal bead obsolete; punctures almost obsolete. Scutellum ogival, two-thirds wider than long. *Elytra* distinctly longer than wide, rather narrowly rounded at apex; sutural bead entirely wanting; discal stria very deep and strongly impressed, coincident with the suture at the apex, disappearing at basal fourth; surface smooth, highly polished, without reticulation, the punctures of the series simple, very minute, distant and excessively feeble, not becoming more distinct at the sides. *Abdomen* feebly reticulate in wavy broken lines, sparsely, asperately punctate, a transverse row of punctures along the apex of each segment more evident, coarsely pubescent. *Legs* moderate; posterior tibial spurs very small, slender, not very unequal; corresponding tarsi slender, nearly three-fourths as long as the tibiae, basal joint scarcely one-half as long as the second, the articulation perfectly free and mobile. Length 1.9–2.4 mm.

New York; Iowa; Texas; California.

The metasternal process is rather narrow, extending about two-thirds the length of the coxæ, the mesosternum being strongly developed in front of it, and slightly tumid. The post-coxal plates are narrowly and very feebly prolonged behind.

This common species, which seems to vary considerably in distinctness of coloration, is quite different from the European *consimilis*, in form, size, coloration, and especially sculpture. The entire surface of the European insect is minutely, but distinctly strigilato-reticulate.

S. viduus n. sp.—Broadly oval, feebly attenuate behind from anterior third, one-half longer than wide, obtusely rounded at apex, highly polished, rufo-piceous, each elytron obliquely paler at apex; under surface, legs and antennæ paler and more flavate. *Head* almost completely impunctate; antennæ rather long and slender, third joint slightly shorter than the next two together, fourth a little shorter than the fifth and equal to the sixth, club rather elongate, becoming broader from base to apex, the eleventh joint robust, the compressed apex rather transversely truncate and subangulate at the sides, very much wider than the ninth. *Prothorax* not definitely punctate; basal lobe and its beaded edge almost obsolete. Scutellum small, ogival, scarcely one-half wider than long. *Elytral* punctures and discal stria nearly as in *apicalis*, the punctures more nearly obsolete, and more decidedly visible in the lateral series. *Abdomen* rather sparsely, coarsely pubescent, asperately punctate. *Legs* rather short and slightly robust; posterior tibial spurs short, subequal,

robust; posterior tarsi nearly three-fourths as long as the tibiae, somewhat robust, the basal joint one-half as long as the second. Length 2.3 mm.

North Carolina; Texas; Arizona.

This species resembles *apicalis* in sculpture, but is decidedly more robust, paler in color, with the apical pale area less defined than in the mature specimens of *apicalis*; the sternal characters are nearly as in that species, but the antennal club is more robust toward apex, and the tibial spurs are also more robust.

The type is a male and exhibits the strongest sexual characters which I have observed in the genus. The third segment of the abdomen has, just before the apex, a short broad porrected tooth in the middle, which does not extend beyond the apical margin, and bears along its apex seven or eight very short robust porrected spinules. The fourth segment has a feeble median impression, and the fifth has the usual very feebly defined transverse impression near the apex.

S. pallidus n. sp.—Evenly elliptical, about two-fifths longer than wide, polished, pale flavo-testaceous throughout. *Head* very finely, feebly punctate; antennae slender, club slender, compact, third joint scarcely as long as the next two combined, fourth shorter than the fifth. *Prothorax* very distinctly more than twice as wide as long; punctuation obsolete; basal lobe extremely feeble, the head obsolete. Scutellum ogival, wider than long. *Elytra* nearly as in *apicalis*, except that they are less attenuate and rather more broadly rounded behind, uniform testaceous in color, and with a very feeble obsolete reticulation near the apex. *Abdomen* very feebly reticulate, the reticulation very fine, dense and strong toward the base of the basal segment. *Legs* moderate or rather short; spurs of posterior tibiae very small, slender; posterior tarsi three-fourths as long as the tibiae; basal joint two-thirds as long as the second and more robust; first and second sparsely, finely spinose beneath; third slightly dilated, bilobed, with a tuft of whitish hair beneath. Length 1.9 mm.

Rhode Island.

The sternal characters are nearly as in *apicalis*, from which this species differs in its smaller size, pale uniform color, relatively slightly longer basal joint of the hind tarsi, and finer, stronger and denser reticulation along the base of the abdomen. The reticulation at the apices of the elytra, although very feeble, is more distinct than in *apicalis*, where it is all but totally obsolete; in *pallidus* it is distinctly traceable over most of the apical half of the elytra, being especially noticeable in lines accompanying the series of punctures.

The species is represented by two specimens which do not indicate any variation.

S. nitidus Melsh.—Proc. Ac. Phil., II, p. 102.—Pale reddish-flavate throughout, very convex, strongly shining, totally impunctate, the fine recumbent hairs rather long. *Head* very feebly reticulate in transverse wavy lines; antennæ rather robust, third joint shorter than the next two together, distinctly clavate, fourth shorter than the fifth, outer joints of funicle more robust, club moderate, slightly more robust toward apex, ninth scarcely longer and a little narrower than the tenth, eleventh two-thirds longer than the tenth. *Prothorax* rather more than twice as wide as long, very obsoletely reticulate; basal lobe and bead almost completely obsolete. Scutellum ogival, wider than long. *Elytra* slightly attenuate and narrowly rounded at apex, the discal stria very narrowly separated from the suture at apex, obsolete at basal third; surface minutely and distinctly reticulate in transverse wavy lines throughout, the minute recumbent hairs arranged in regular series, the punctures not evident, each being entirely filled by the hair. *Abdomen* feebly, coarsely reticulate, distinctly asperately punctate, coarsely pubescent. *Legs* rather short and robust; tibiæ short and broad, coarsely spinose; terminal spurs of the posterior very minute, subequal, not longer than some of the spinules of the terminal fimbria; corresponding tarsi short, very slightly longer than the anterior, the basal joint relatively long, about three-fourths as long as the second which is shorter than usual. Length 1.3 mm.

New York; Iowa; Texas.

The metasternum is reticulate at the sides, the process moderate in width, coarsely sparsely setose, the mesosternum in front of it much broader and distinctly prominent.

This minute species is very distinct and, as far as I have seen, has no very close allies; it is the only species in which the punctures of the elytral series become completely invisible, and confused with the fine reticulation of the surface. In very pale specimens the chitinous cells of the elytra surrounding the base of the hairs become darker, giving the appearance of series of coarse areolæ or punctures by transmitted light and under low magnifying power. The form of the body is extremely convex, resembling some of the small convex species of *Cercyon*.

The minute setigerous punctures of the elytra, described under *Phalacrus*, are observable here to a very limited extent.

S. aquatilis Lec.—Proc. Ac. Phil., 1856, p. 17.—Almost evenly elliptical, about two-thirds longer than wide, ochreous-flavate throughout, shining. *Head* excessively finely, sparsely punctate and very finely, feebly reticulate; antennæ nearly as in *nitidus*. *Prothorax* rather short, much more than twice as wide as long; basal lobe very broad and extremely feeble, bead almost

completely obsolete; surface very minutely but distinctly reticulate in broken transverse wavy lines, the punctures very sparse and just visible. Scutellum feebly reticulate, ogival, with the sides strongly arcuate, one-half wider than long. *Elytra* very feebly attenuate from before the middle, evenly rounded at apex; discal stria as in *obtusus*; surface finely but strongly and distinctly reticulate in wavy lines, subalutaceous in lustre; punctures of series very evident, coarser and distinctly crescentiform in the rows toward the suture and the sides, smaller and feebler but still distinctly crescentiform in the median rows. *Abdomen* coarsely pubescent, distinctly reticulate, rather strongly, asperately punctate, especially as usual toward the middle and apex. *Legs* moderate; posterior tibiae rather slender, sparsely and coarsely setose; spurs small and rather distinctly unequal, not longer than the outer spinules, the same tarsi setose beneath, moderate in length, with the basal joint one-half as long as the second. Length 1.8 mm.

California.

The metasternum is reticulate but not distinctly punctate, very sparsely and rather coarsely pubescent; the sternum and sternal processes throughout are nearly as in *obtusus*, from which this species differs in its pale color, more distinct reticulation, and very notably in the character and strength of the elytral punctures. It is rare, and although fortunate enough to secure a single specimen myself, I am not certain of the exact locality; it is, however, probably southern.

S. floridanus n. sp.—Rather broadly oval, convex, widest a little before the middle, dark piceous-brown above, with the apex conjointly and rather abruptly paler, the anterior margin of the apical pale area posteriorly angulate in the middle, paler, flavo-testaceous throughout beneath, polished. *Head* extremely feebly, finely reticulate, the punctures very sparse and excessively minute; eyes moderate; antennae slender, the club abrupt, rather small and slender and scarcely as long as the five preceding joints combined, ninth and tenth joints subequal, slightly transverse, eleventh oval, longer than wide, obtusely rounded at apex and rather shorter than the two preceding. *Prothorax* short, nearly three times as wide as long, with the feeblest possible trace of transverse reticulation toward the base and sides, the punctures very sparse and excessively minute; base transverse, with a small feeble sinuation at each side of, and at some distance from, the scutellum; basal bead very fine, the stria disappearing at lateral third. Scutellum small, triangular, one-half wider than long, the sides and apex rounded. *Elytra* fully three times as long as the prothorax; sides more strongly arcuate at basal fourth or fifth, thence feebly convergent behind and very feebly arcuate, the apex rather abruptly and somewhat narrowly rounded; basal stria very fine, reflexed along the scutellum; surface very finely reticulate throughout, the sculpture becoming very feeble toward base, the reticulations not forming very well-defined transverse wavy lines; single discal stria fine but distinct, dis-

appearing at basal third or fourth; disk without impressed lines, the punctures of the distant series obsolete throughout the width, and only indicated by the extremely minute recumbent hairs growing from slightly more marked retal lines at their points of origin. Under surface and legs normal, the second joint of the posterior tarsi short, about one-half longer than the first; tibial spurs very small and slender. Length 1.5 mm.

Florida (Lake Poinsett). Mr. Schwarz.

A small species allied to *apicalis* and *consimilis*, but distinguished from the former by its smaller size, more broadly oval, less convex and more posteriorly attenuate form, and elytral reticulation, and from the latter by its shorter prothorax, more abruptly marked apical pale area, less convex form and other characters.

S. obscurus n. sp.—Rather broadly oval, piceous above; antennæ, legs and under surface pale testaceous; upper surface polished. *Head* extremely feebly and sparsely punctate; antennæ rather slender, third joint shorter than the next two together, fourth much shorter than the fifth, club rather slender, sides nearly parallel, ninth joint much longer than the tenth and slightly shorter than the eleventh. *Prothorax* scarcely visibly and very sparsely punctate, not reticulate; basal lobe very broad and feeble, the marginal bead almost obsolete. Scutellum one-half wider than long. *Elytra* more strongly narrowed behind in apical half, rather strongly rounded at apex, unicolorous or sometimes very feebly paler toward apex; discal stria strong, obsolete at basal third or fourth, punctured as in *apicalis*; surface finely, feebly but distinctly reticulate, the reticulations visible over the entire surface except in the vicinity of the base, where they become obsolete, generally in very broken wavy lines on the upper portions of the disk. *Abdomen* very strongly reticulate, the portions very near the base, and also the metasternum toward the sides, almost granuloë. *Legs* moderate; posterior tarsi rather short and robust, scarcely two-thirds as long as the tibiæ, setose beneath, the first joint two-thirds as long as the second; tibial spurs small. Length 1.8–2.0 mm.

Iowa. Mr. Wickham.

The metasternal process is rather wider than in *apicalis*, and the mesosternum in front of it is very strongly tumid and prominent. The sexual characters are nearly as in *viduus*, except that the tooth of the third segment is more deflexed, with the spinules excessively short. This species is very easily distinguishable from *apicalis* and *viduus* by its small size, more rounded form, dark piceous color, which does not become noticeably paler at apex except from the transparency of the elytra, and by the reticulation of the upper surface; it is represented by a good series of specimens, and does not vary appreciably.

S. obtusus Lec.—Proc. Ac. Phil., 1856, p. 17.—Almost evenly elliptical, moderately convex, blackish-piceous throughout the body, legs and antennæ; tarsi slightly paler; upper surface shining. *Head* very feebly and sparsely punctate; antennæ nearly as in *nitidus*, but with the ninth joint rather longer. *Prothorax* extremely minutely, feebly and sparsely punctate, extremely obsoletely reticulate in broken wavy lines; basal lobe very broad and feeble, the bead very fine but somewhat distinct. Scutellum one-half wider than long. *Elytra* rather obtusely rounded behind, finely but rather distinctly reticulate in transverse wavy lines over the entire disk; discal stria very strong, coincident with the suture at the apex, becoming obsolete at basal third or fourth; punctures of the series very fine and feeble but visible, not more distinct but rather wider at the sides, where, however, they do not become crescentiform, but simply a slight deepening of the lines forming the reticulation at the points of attachment of the hairs. *Abdomen* reticulate, sparsely, coarsely pubescent. *Legs* moderate; spurs of posterior tibiæ very small, subequal, and about as long as the exterior spinules of the terminal fimbria; the corresponding tarsi rather slender, nearly three-fourths as long as the tibiæ, with the basal joint one-half as long as the second. Length 1.5 mm.

California (Santa Cruz Co.).

The metasternal process in this species is rather broad, reticulate but not distinctly punctate, the mesosternum transversely, moderately prominent in front of it, the prosternal process strongly dilated and broadly rounded at apex, the spinules rather close and very stout, distinctly shorter than in *apicalis*, but rather longer than in *attenuatus*, in this respect approaching the second of the arbitrary groups into which I have divided the genus.

The type of LeConte seems to be an unusually robust specimen, and I have several which are distinctly narrower. The under surface and antennæ are sometimes paler from immaturity.

S. nanulus n. sp.—Narrowly and evenly elliptical, strongly convex, highly polished, piceous-black throughout above; legs, antennæ and under surface testaceous. *Head* without trace of punctuation or reticulation; antennæ rather short, the funicle very slender, the outer joints more robust, club rather large and compact, the ninth joint but very slightly longer than the tenth, the eleventh almost as long as the two preceding together, although moderate in length. *Prothorax* impunctate and not at all reticulate, the median basal lobe broadly arcuate and rather well developed, the marginal bead obsolete. Scutellum small, ogival, about two-thirds wider than long. *Elytra* highly polished, without trace of reticulation except near the apex and narrowly along the sides, where it is very feeble and not at all distinct; discal stria strongly impressed, totally impunctate, obsolete at basal third; punctures of the discal series completely obsolete and only represented by the minute hairs, except abruptly, very near the sides, where they become dilated, distinct and cres-

centiform, although not at all deeply impressed. *Abdomen* somewhat coarsely and densely, asperately punctate, and very coarsely pubescent. *Legs* very short and somewhat robust; the posterior tibiae more strongly arcuate within, strongly setose, nearly spinulose externally; spurs very small, slender, unequal; the corresponding tarsi four-fifths as long as the tibiae, one-half longer than the anterior, with the first joint about two-thirds as long as the second. Length 1.0–1.2 mm.

New Mexico (Albuquerque). Mr. H. F. Wickham.

The metasternal process is short and very broad, coarsely reticulate, but with the lines very feeble, truncate at apex, very sparsely pubescent, the mesosternum before it moderate in length, not very tumid, pubescent at the sides only. The prosternal process is broad, the terminal setose spines long and conspicuous.

This is the most minute species known to me within our faunal limits, and is so distinct in all its characters that it cannot be mistaken for any other.

S. pusillus Lec.—Proc. Ac. Phil., 1856, p. 17.—Oval, slightly attenuate behind from anterior third, strongly convex, piceous-black throughout above, pale testaceous beneath, strongly shining. *Head* very minutely, feebly punctate, not reticulate; eyes rather large; antennae moderate, third joint clavate, nearly as long as the next two together, outer joints of funicle but slightly more robust, seventh much longer than the eighth, the latter strongly transverse, club rather long and slender, the ninth joint longer than wide, longer than the tenth and much shorter than the eleventh. *Prothorax* excessively minutely and feebly punctate, not at all reticulate; basal lobe extremely feeble, broad, the marginal bead almost obsolete. Scutellum one-half wider than long. *Elytra* finely and distinctly reticulate in wavy broken transverse lines; discal stria obsolete at basal third, rather deeply impressed, punctate anteriorly; surface with rows of punctures of which the two nearest the suture are very distinct, but obsolete in basal and apical third, rather deeply impressed and very narrowly but strongly crescentiform; the rows thence to the sides composed of more minute and very feeble punctures, which are not larger or more distinct, and rather more confused near the sides, except a regular series just within the extreme lateral bead which is composed of slightly larger, more closely placed and feebly dilated punctures. *Abdomen* very sparsely, feebly punctate and pubescent. *Legs* slender; posterior tibiae slightly wider at apical third than at apex, spinose, especially externally; terminal spurs minute, the tarsi slender, with the basal joint rather more than one-half as long as the second. Length 1.1–1.3 mm.

Florida; Texas (Galveston).

The post-coxal portion of the mesosternum is indefinitely limited and angulate behind; the metasternum is very strongly reticulate, and rather densely and distinctly punctate and pubescent in the

middle posteriorly; the process is wide, short, much smoother, very sparsely pubescent and not distinctly punctate; the mesosternum in front of it very short and feebly tumid, not at all conspicuous. The prosternal process is very strongly dilated at apex, the setose spines unusually long.

This minute species is abundant and widely distributed throughout the Gulf States.

S. modestus n. sp.—Somewhat broadly oval, very feebly narrowed behind the prothorax, polished, rather dark brownish-testaceous above, the legs, antennæ and under surface pale flavo-testaceous. *Head* extremely obsoletely and sparsely punctate, not at all reticulate; eyes moderate; antennæ rather slender, third joint nearly as long as the next two together, the fourth shorter than the fifth, seventh longer than the eighth, the latter slightly transverse, club rather slender and compact, ninth joint but slightly longer than the tenth, and but slightly more than one-half as long as the eleventh. *Prothorax* nearly as in *pusillus*. *Scutellum* two-thirds wider than long. *Elytra* finely and distinctly reticulate throughout in transversely wavy broken lines; discal stria strongly impressed, punctate anteriorly, obsolete at basal third, the punctures of the two rows nearest the suture very strongly impressed, but obsolete in basal and apical third, the punctures of the remaining rows thence to the lateral margins very feeble but broad and distinctly crescentiform, becoming broader in the lateral rows. *Abdomen* shining, sparsely, coarsely pubescent, much more densely so toward the middle and apex. *Legs* rather slender, moderate in length; posterior tibiæ rather wider at apical third than at apex, having series of spinose setæ, more evident along the external edge; terminal spurs very small, slightly unequal; the corresponding tarsi very slender, but slightly shorter than the tibiæ, with the basal joint fully one-half as long as the second. Length 1.3–1.5 mm.

Texas (Austin).

The post-coxal portion of the mesosternum is not at all defined posteriorly; the metasternal process is short and broad, densely pubescent, the mesosternum in front of it rather long, feebly tumid, scabrous and rather densely, coarsely pubescent; the prosternal process is very abruptly, strongly dilated at apex, the terminal setæ very long and conspicuous.

The nature of the elytral punctuation, especially in the lateral series, the larger size, paler coloration, and more prominent mesosternum will readily distinguish this species from *pusillus*, to which it is otherwise closely allied. It was taken in considerable abundance.

S. subalutaceus n. sp.—Almost evenly oval, fully two-thirds longer than wide, strongly convex, moderately shining, piceous-black throughout

above; legs, antennæ and under surface dark testaceous. *Head* finely and strongly reticulate, the reticulations rounded and not tending in the least to a linear arrangement; antennæ moderate, coarsely setose, fourth joint shorter than the fifth, club rather robust, moderate in length, the eleventh joint but slightly longer than the ninth. *Prothorax* more than twice as wide as long; base transverse, without a median lobe but slightly sinuate for a short distance each side of the scutellum; bead very minute; surface not visibly punctate, finely reticulate, the reticulations tending to a transverse arrangement. Scutellum ogival, nearly twice as wide as long, transversely reticulate. *Elytra* finely and very strongly reticulate over the entire surface, the reticulations tending to form very broken transverse wavy lines; punctures of the series almost completely obsolete although perceptible, scarcely more visible at the sides, where they become slightly wider but not at all crescentiform: discal stria feeble, coincident with the suture at the apex, very short, disappearing in a row of feeble punctures at about the middle. *Abdomen* strongly reticulate, sparsely, finely punctate, very sparsely pubescent. *Legs* moderate, tibiae slender; posterior spurs small, subequal, the corresponding tarsi about two-thirds as long as the tibiae, with the basal joint more than one-half as long as the second. Length 1.4 mm.

New Jersey (Cape May).

The metasternal process is very wide, broadly rounded at apex, the mesosternum in front of it rather short, transverse and but very slightly tumid; the prosternal process is wide, and the spinules along its apical margin very short and widely distant. The surface of the metasternum in the middle anteriorly is extremely sparsely pubescent, and not visibly punctate.

The dark color and sternal structure will at once distinguish this small species from *nitidus*, which it somewhat resembles in elytral sculpture and punctuation, and the short very feeble discal stria separates it from every other species of the genus known to me. It appears, however, to resemble the Mexican *Olibrus porrectus* Sharp, which is almost certainly not an *Olibrus*.

S. convergens n. sp.—Somewhat narrowly oval, very convex, polished, dark rufo-testaceous throughout, distinctly attenuate behind from the base of the elytra, the apex narrowly subtruncate and about one-half as wide as the base. *Head* finely but rather distinctly punctate, more densely so toward the eyes and base, not at all reticulate; antennæ moderate in length, third joint rather shorter than the next two together, fourth shorter than the fifth, seventh and eighth subequal in length, more robust, club very long and strongly developed, ninth and tenth joints equal in length, more acutely angular on the anterior side which is more densely pubescent, eleventh nearly as long as the two preceding. *Prothorax* rather long, not more than twice as wide as long, highly polished, not reticulate, very minutely and rather sparsely punctate;

basal lobe very feeble, the marginal bead obsolete. Scutellum very short and broad, more than twice as wide as long. *Elytra* excessively minutely and feebly strigilate, having series of very minute simple punctures which, abruptly, near the sides, become strongly transverse, confused and feebly crescentiform, the sculpture also becoming more granulato-reticulate; discal stria deeply impressed, obsolete at basal third. *Abdomen* sparsely, coarsely pubescent, the transverse rows near the apices of the segments almost spinose. *Legs* moderate in length, rather robust; spurs of posterior tibiæ slightly robust, moderate in length, and very slightly unequal; posterior tarsi rather robust, the third joint rather strongly dilated and bilobed, first joint about two-thirds as long as the second, the latter spinose beneath and longer than the fifth which is very slender. Length 2.0 mm.

Florida. Mr. Schwarz.

The metasternal process is very broad and rather long, advancing almost to the anterior limits of the coxæ, subtruncate at apex with the lateral beaded margin very wide, the surface polished, and almost completely impunctate and glabrous, the mesosternum before it very short, slightly tumid, glabrous in the middle but scabrous and setose at the lateral angles. The prosternal process is broad, dilated at apex, having a fine strong beaded margin throughout the sides and apex, the setæ of the transverse apical series very short but numerous.

This is a decidedly aberrant species, especially in tarsal structure. It is also peculiar in having the small foveæ at the sides of the head near the eyes quite as well developed as in *Phalacrus*.

S. attenuatus n. sp.—Narrowly ovoidal, convex; sides of the elytra gradually convergent from base to apex, the latter narrowly rounded; dark rufo-testaceous throughout, polished. *Head* very strongly retractile, polished, not reticulate, very minutely and sparsely punctate; antennæ nearly as in *convergens*, the club rather more slender and more symmetrical. *Prothorax* not more than twice as wide as long, the sides rather feebly arcuate; basal lobe almost completely wanting, the marginal bead nearly obsolete; surface not reticulate, excessively finely, feebly and very sparsely punctate. Scutellum very short, twice as wide as long. *Elytra* excessively minutely strigilate in transverse wavy lines which are obsolete toward suture and base; discal stria distinct, obsolete at basal third; punctures of the series equal throughout the width from the suture to the sides, deeply impressed, narrowly and strongly crescentiform and distinct, except near the base and toward apex where they become nearly obsolete; intervals each with a single more irregular series of very feeble and much smaller punctures of the same general character, the series not confused near the sides. *Abdomen* finely reticulate, sparsely, coarsely pubescent. *Legs* somewhat robust; posterior tibiæ more arcuate within, rapidly narrowed toward base; spurs very small, slightly unequal; tarsi slightly robust, basal joint two-thirds as long as the second. Length 1.6 mm.

New York; Michigan; Texas.

The head is strongly retracted within the prothorax in each of the single representatives of the above localities. The metasternal process is rather narrow, short, strongly rounded at apex, and strongly beaded at the sides, the mesosternum in front of it unusually long but almost perfectly flat and not setose, except very sparsely at the sides. Prosternal process rather wide, extending rather further than usual beyond the coxæ, with the free edge strongly, transversely arcuate, and very acute; the process is very minutely beaded at the sides, but not at all at apex, where the setiform spinules are short, erect and very widely spaced.

This species is quite as aberrant as *convergens*, but does not at all resemble it in the structure of the sterna. The post-coxal portion of the mesosternum is not as long as in some other species, but is very clearly and abruptly limited throughout by an evenly arcuate declivous line. The terminal setæ of the prosternal process are not quite as short as in *convergens*, but are very much more widely spaced, being only about four in number.

S. elongatulus n. sp.—Subelongate, convex, polished, black above, the elytra gradually slightly paler at apex; under surface pale, rufo-testaceous throughout; sides feebly convergent behind from the base of the elytra. *Head* retractile, feebly convex, rather closely but extremely finely punctate; surface not reticulate; eyes rather large; antennæ slender, the club slender, somewhat compact, attenuate toward base, the ninth joint rather longer than wide, longer and narrower than the tenth, eleventh about as long as the two preceding. *Prothorax* rather elongate, scarcely twice as wide as long; sides evenly, distinctly arcuate; surface polished, not at all reticulate, excessively minutely punctate, the punctures not very sparse; basal lobe extremely feeble, the bead fine but distinct near the middle, obsolete laterally. *Scutellum* small, nearly twice as wide as long, angulate; sides straight, abruptly arcuate near the base. *Elytra* rather distinctly more than twice as long as the prothorax; sides nearly straight toward base, together somewhat narrowly rounded behind; basal stria fine, reflexed along the scutellum, the single discal stria very coarse and deeply impressed, becoming gradually feebler and punctate toward base; disk coarsely and strongly reticulate in well-defined transverse wavy lines, the sculpture becoming abruptly almost obsolete near the base, having rather distant rows of coarse deeply-impressed rounded punctures, which are scarcely perceptibly stronger toward the suture, the rows not attaining the base and becoming gradually obsolete toward the apex, the punctures of the lateral rows distinct but not dilated, the rows not accompanied by impressed lines. Length 1.3 mm.

Florida (Tampa). Mr. Schwarz.

The structure of the under surface agrees quite closely with that of *attenuatus*, to which this species is most unquestionably allied, but from which it is abundantly distinct in size, coloration, and punctuation, the punctures of the elytral series being much less widely spaced and more numerous.

LITOCRUS Erichs.

This genus, and the two which follow, are distinguished from all the others of the family by an abrupt and very radical difference in the structure of the posterior tarsi, for here, instead of the basal joint being very much shorter than the second, it is correspondingly longer, and in the present genus is extremely developed.

The four species which are assigned below to *Litochrus*, possess the following assemblage of characters, *pulchellus* being assumed as the type:—

Ligula short, broad, with a small median tooth at apex, the paraglossæ large, dilated, semimembranous, rather thick and slightly reflexed. Labial palpi very short and robust, first joint minute, triangular; second oblique, short, slightly longer than the first, strongly transverse; third longer than the two preceding together, extremely robust, subquadrate, slightly longer than wide, strongly compressed and broadly, transversely truncate at apex. Prosternal process inflexed at apex, not setose. Mesosternum in front of the metasternal process very short and transverse, not prominent, forming a fine undilated bead behind the middle coxæ. Metasternal process rather long and wide. Posterior tibiae and tarsi very slender, the first joint of the latter much longer than the entire remainder; tibial spurs well developed, slender.

The true *Litochrus* of Erichson agrees with this, according to description, in the structure of the ligula, but differs greatly in the labial palpi,¹ and the species here assigned to it may possibly have to be separated. The fact that widely different localities have been assigned to the genus by its author, renders it almost certain that several genera have been confounded, more especially as we know now that there are several distinct genera with elongate basal joint

¹ The labial palpi are described by Erichson as having the first joint long, somewhat longer than the second, the third elongate-ovoidal, which is much more true of either *Litochropus* or *Ochrolitus*, than it is of the American species of *Litochrus*. This is, however, a matter which cannot be satisfactorily settled until the entire family is monographically revised.

in North America alone. The original description probably refers to either the Madagascan, New Holland or Tasmanian representatives.

Our four species may be easily separated as follows:—

Castaneous ; elytra each with two large oblique spots of pale flavate.

pulchellus

Piceous-black ; elytral suture, lateral and apical margins, and a transverse band at basal third paler, rufo-testaceous.....**crucigerus**

Piceous above throughout, the suture sometimes very narrowly, indefinitely and feebly rufescent**immaculatus**

Intense black throughout above.....**aterrimus**

L. pulchellus Lec.—Proc. Ac. Phil., 1856, p. 17.—Evenly and not very broadly oval, moderately convex, dark brownish-testaceous, the elytra each with two oblique pale flavate spots, one near the base and the other near the apex, the latter the larger, neither attaining the suture or the lateral margin, the anterior extending from near the humeri to anterior third, and slightly sinuous ; under surface throughout pale flavate. *Head* polished, extremely minutely and rather sparsely punctate ; eyes large ; antennæ slender, outer joints of funicle slightly more robust and slightly transverse, third not as long as the next two combined, club slender, as long as the seven preceding joints, eleventh distinctly longer than the two preceding together. *Pothorax* short, much more than twice as wide as long, polished, not reticulate, very finely, moderately sparsely punctate ; basal lobe wide, abrupt, short but very distinct, the apex transverse ; marginal bead obsolete. *Scutellum* angulate, slightly wider than long ; sides feebly arcuate. *Elytra* very minutely but distinctly strigilate in transverse wavy lines throughout, having series of very wide feeble and feebly crescentiform punctures, which become wider near the sides where the series are still regular ; intervals near the sides with single regular series of very small punctures of similar nature, which, toward the suture, become much more minute and feeble, and confusedly dispersed over the entire interval, especially between the discal striæ ; the latter fine but distinct, obsolete at basal third or fourth, the first continuous to the apex, the second coincident with the first at apical fifth ; sutural bead obsolete, except toward apex, where it is excessively fine, feeble and just traceable. *Legs* very slender ; posterior tibial spurs slender, long and distinct, slightly unequal, the tarsi extremely slender, cylindrical, the first joint fully one-third longer than the entire remainder. Length 1.1–1.7 mm.

Florida ; Texas.

The metasternal process is wide, and extends to the anterior limits of the coxæ, the mesosternum before it being very short and transverse, and not at all prominent ; the prosternal process is rather wide and feebly dilated at the inflexed apex.

L. crucigerus n. sp.—Narrowly, almost evenly elliptical, strongly convex, polished, piceous-black, the suture and lateral and apical margins

narrowly, and a transverse line crossing the suture at basal third paler, rufo-testaceous, the pale areas not very abruptly limited; under surface pale flavo-testaceous. *Head* and antennæ nearly as in the preceding species, the former more sparsely and unevenly punctate. *Prothorax*, scutellum and strigilation of the elytra nearly as in *immaculatus*, the former slightly more sparsely punctate. *Elytra* having rows of extremely wide crescentiform punctures, nearly as in the preceding species, but rather more strongly impressed, the punctures of the intervals very small but distinct toward the suture, becoming almost obsolete laterally; two discal striae distinct, obsolete at basal third. *Legs*, tarsi and sternal structure nearly as in *pulchellus*. Length 1.5 mm.

Florida. Mr. Schwarz.

This species differs conspicuously from the others in coloration, but the structural characters are nearly alike in all of them, the punctures in general, and especially the very strongly transverse crescentic punctures of the elytra, are, however, decidedly most distinct in the present species.

I. immaculatus n. sp. (Zimm. MS.)—Narrowly and almost evenly oval, strongly convex, polished; upper surface dark piceous, the suture feebly rufescent; under surface throughout pale flavo-testaceous. *Head* not reticulate, polished, finely but rather distinctly punctate, the punctures broadly, feebly impressed, eyes rather large; antennæ nearly as in *pulchellus*. *Prothorax* much more than twice as wide as long, polished, not reticulate, the basal lobe abrupt, short, distinct, truncate, the marginal bead obsolete; punctures sparse, very fine but somewhat distinct, broadly, very feebly impressed. Scutellum nearly twice as wide as long; sides strongly arcuate toward base, straight near the apex; angle not appreciably rounded. *Elytra* finely, transversely strigilate in wavy lines; sutural bead, discal striae and punctures of the principal series nearly as in *pulchellus*, the punctures of the intervals excessively minute and feeble, and almost obsolete even toward the sides. *Abdomen* shining, coarsely reticulate, the lines very fine, very sparsely pubescent. *Legs* slender; posterior tarsi extremely slender, the first joint much longer than the entire remainder. Length 1.5 mm.

New Jersey; South Carolina.

The metasternum is shining, coarsely reticulate, the lines very fine; surface very sparsely pubescent, almost impunctate except posteriorly toward the middle, where the punctures are fine and subasperate; process broad, extending to the anterior limits of the coxæ, feebly constricted near the apex, the latter broadly, feebly arcuate, the mesosternum before it extremely short, transverse, finely setose, not prominent; the prosternal process is moderate in width.

This species is more narrowly oval and convex than *pulchellus*, and is very differently colored.

L. aterrimus n. sp.—Oval, about two-thirds longer than wide, strongly convex; sides very feebly convergent behind from near the base of the elytra; intense black throughout above, paler, piceous beneath, the legs and antennæ flavate; shining. *Head* not reticulate, very minutely and rather sparsely punctate; eyes moderate; antennæ rather short, third joint elongate, obconical, rather longer than the next two, four to eight very short, compact; club small and slender, about as long as the preceding seven joints combined, ninth just visibly longer and wider than the tenth, eleventh oval, a very little longer than wide, shorter than the two preceding. *Prothorax* rather short, more than twice as wide as long, extremely minutely and obsoletely punctate, not at all reticulate, the basal lobe broad and rather strong, the marginal bead almost completely obsolete. Scutellum triangular, two-thirds wider than long. *Elytra* rather more than three times as long as the prothorax, evenly and somewhat narrowly rounded at the apex; discal striæ very fine, vanishing at basal third, the first continuous to the apex, the second approaching very near but not joining the first at apical fifth or sixth; disk coarsely reticulate in very wavy broken lines, having distant regular rows of small widely-spaced crescentiform and very feeble punctures, which become slightly wider and stronger near the sides, the punctures of the intervals almost completely obsolete. *Legs* moderate; posterior tibiæ very slender, cylindrical, the terminal spurs very unequal and rather long, the corresponding tarsi very slender and cylindrical, the first joint just visibly longer than the remainder. Length 1.2 mm.

Florida (Biscayne Bay). Mr. Schwarz.

Remarkably distinct in its intense black color and feeble punctures. The eyes are, as usual, very coarsely faceted, the facets, however, unusually convex, especially beneath. The metasternal process is wide and long, extending slightly beyond the coxæ, the apex feebly arcuate, the sides parallel, very finely beaded and not at all incurvate; the mesosternum forms a very thick and even apical bead. In *crucigerus* and *immaculatus* the metasternal process is narrower, the sides being distinctly, although feebly, incurvate.

LITOCROPUS n. gen.

Mentum slightly wider than long, transversely truncate at apex, the sides strongly lobed just before the middle. Ligula small, narrow and rather short, deeply and distinctly sinuate in the middle at apex, not at all dentate, the paraglossæ very small and nearly obsolete. Labial palpi moderate; first joint slightly longer than wide, distinct, but much shorter and narrower than the second, the latter feebly obconical; third not strongly compressed, but slightly wider than the second, oblique, dilated toward base, attenuate toward apex, as long as the two preceding combined. Maxillary palpi well developed; second and third joints obliquely truncate at apex, the latter shorter and not as long as wide; fourth slightly longer than the preceding three together, not wider than the second, cylindrical in the basal half, feebly narrowed toward

apex in the apical half. Antennæ with the club very long and finely, asperately punctate throughout. Prosternal process moderate in width, the apex inflexed and unarmed; metasternal process rather wide, with the sides parallel, rather long, extending fully to the anterior limits of the coxæ, broadly, evenly rounded at apex. Mesosternum in front of the metasternal process forming a very thick, strongly prominent, feebly scabrous and minutely setose marginal bead, which becomes fine along the inner side of the coxæ, and is dilated behind the middle acetabula as in *Acylomus*. Legs slender; posterior tarsi very slender, cylindrical, nearly as in *Litochrus*, but with the first joint scarcely four-fifths as long as the entire remainder; posterior tibial spurs moderate, very slender, decidedly unequal.

In the structure of the ligula, labial palpi, and the extension of the mesosternum behind the middle acetabula, this genus differs very greatly from those species which we consider *Litochrus* and represented by *pulchellus* as a type; the basal joint of the posterior tarsi is also distinctly shorter, and the third joint of the latter is very obliquely truncate at apex, the fourth with its ill-defined basal lobe being inserted at the middle of the truncation.

L. scalptus n. sp.—Rather broadly oval, piceous-black throughout above; under surface, legs and antennæ very pale flavate; polished. *Head* finely, sparsely but rather distinctly punctate; eyes unusually small; antennæ robust, the club almost as long as the entire remainder, third joint fully as long as the next two together, outer joints of funicle robust and transverse, ninth and tenth subequal in length, eleventh as long as the two preceding. *Prothorax* very feebly, sparsely and obsoletely punctate, polished; basal lobe as in *Litochrus* but more feeble; marginal bead obsolete. Scutellum ogival, nearly twice as wide as long. *Elytra* entirely polished, without trace of fine sculpture, having series of long fine transverse scratches, the punctures entirely obsolete, although each of the fine lines has a very minute recumbent hair in the middle, the lines feebler toward base and apex, the series so close that the transverse lines are sometimes continuous laterally; sutural bead subapical, excessively fine; discal striæ obsolete at basal third, distinct, the first continuous to the apex, the second coincident with the first at apical fourth. *Abdomen* finely, feebly reticulate, sparsely, coarsely pubescent. *Legs* moderate in length. Length 1.5–1.7 mm.

North Carolina; District of Columbia.

The posterior tibiæ, in the males, are slightly more robust than in the females, but there does not seem to be any decided sexual difference in the terminal spurs or tarsi.

The remarkable transverse scratches, which are an extreme modification of the ordinary type of transversely crescentic punctures, are peculiar to *Litochropus* and *Ochrolitus*, and it is probable that *Litochrus globulus* Sharp, should be assigned to the present genus.

OCHROLITUS Sharp.

This genus is well distinguished from either of those which precede by the structure of the prosternal process, which is here more developed, projecting beyond the anterior coxæ, having the apex free, with an acute edge which is transversely arcuate.

The two species described below differ generically. I did not receive the type of *tristriatus* until a time subsequent to the printing of the table of genera, given on page 91, and had previously regarded *rubens* as a typical form of the genus; it is therefore undesirable, at present, to create a new genus for the latter species, although this must be done when the family is monographically revised. The species are very easily distinguishable as follows:—

Prosternal process moderate in width, feebly, longitudinally convex, extending but slightly beyond the coxæ, the apex moderately dilated, very feebly arcuate, unarmed. Mesosternum not developed behind the middle acetabula. First joint of the posterior tarsi much longer than the next two combined. Discal striæ three in number	tristriatus
Prosternal process wider and longer, projecting distinctly beyond the coxæ, flat, spatuliform, the apex very strongly rounded and bearing a series of five or six long spinose setæ. Mesosternum developed as a short arcuate plate behind the middle acetabula. Basal joint of the posterior tarsi shorter, subequal in length to the next two together. Discal striæ two in number.....	rubens

O. tristriatus n. sp.—Oval, very convex, rather more than one-half longer than wide, widest near the base of the elytra, the sides thence very feebly convergent behind; upper surface shining, dark piceo-rufous, the elytra slightly opalescent; beneath paler, rufo-testaceous. *Head* not reticulate, very finely but distinctly and rather densely punctate; eyes moderate; antennæ long and well developed, second joint small, much shorter than the third, the latter equal in length to the fourth and but slightly longer than the fifth, eighth but slightly wider than the seventh, scarcely as wide as long; club nearly symmetrical, rather loose, as long as the five preceding joints combined, ninth joint very slightly longer than the tenth and fully two-thirds as long as the eleventh. *Prothorax* large, but slightly more than twice as wide as long, the base very feebly incurvate between the basal angles, the basal lobe rather wide but excessively feeble, the bead completely obsolete; surface not reticulate, extremely minutely and moderately sparsely punctate, the fine hairs unusually long and distinct. Scutellum triangular, nearly twice as wide as long. *Elytra* scarcely more than twice as long as the prothorax, the apex evenly, semicircularly rounded, excessively minutely and densely strigilate, the lines not resolvable under a power of 80, having long transverse very distinct, and anastomosing scratches, from which arise the fine but rather

distinct hairs, the latter not being very definitely arranged; each elytron with three distinct discal striæ, vanishing at about basal third, and converging toward the apex, the outer two slightly abbreviated; sutural bead fine, but distinct toward the apex. *Legs* rather robust; posterior tibiæ cylindrical, narrowed in basal third, almost transversely truncate, the spurs long and very unequal, the corresponding tarsi long, cylindrical, the basal joint one-third longer than the next two together. Metasternum coarsely and strongly punctate toward the middle. Length 2.1 mm.

Florida (Key West). Mr. Schwarz.

The metasternal process is narrow and rather short, the mesosternum before it forming a rather long gradually declivous piece, feebly enveloping the coxæ at the sides,—almost exactly as in *Litolibrus*—and not developed behind the middle acetabula, except as a fine marginal bead. The prosternal process is finely beaded at the sides but not at the free acute and feebly arcuate apex, the latter being also devoid of true spinose setæ.

There can be but little doubt that this species is a complete representative of *Ochrolitus*, but it is also certain, on comparison with the carefully drawn figure of *O. optatus* Sharp, that it cannot be identical with that species. In the present form the transverse scratches are very strong and extend throughout the elytral disk, except very near the base.

O. rubens Lec.—Proc. Ac. Phil., 1856, p. 16.—Evenly, moderately broadly oval, strongly convex, polished, bright rufous throughout above and beneath. *Head* finely, sparsely punctate, polished; eyes moderate; antennæ moderate, funicle rather slender, outer joints slightly robust, the eighth decidedly wider and rather strongly transverse, third as long as the fourth and fifth, the latter equal, longer than wide, club robust, moderate in length, nearly symmetrical, ninth and tenth joints nearly equal in length, the eleventh as long as the two preceding combined. *Prothorax* rather long, but slightly more than twice as wide as long, polished, almost completely impunctate; basal lobe excessively feeble, not abruptly limited, the marginal bead obsolete. Scutellum small, ogival, wider than long. *Elytra* excessively minutely, transversely strigilate in wavy lines toward apex only, covered throughout except toward base with very deep long transverse scratches, which are sometimes broadly angulate at the minute hairs, the punctures rather distinct near the suture; discal striæ strong, obsolete at basal fifth or sixth, the second coincident with the first at apical fourth. Posterior tarsi very slender, cylindrical, the basal joint three-fourths as long as the entire remainder; tibial spurs well developed, unequal. Length 1.8 mm.

North Carolina; Florida.

This is a very distinct species which appears to be rather rare;

I have seen three specimens. The setæ of the prosternal process are not erect as in the Stilbide genera, but perfectly porrected. The metasternal process is rather long, moderate in width, projecting almost to the anterior limits of the coxæ, the apex truncate, the mesosternum before it abruptly declivous and not in the least prominent.

CORYLOPHIDÆ.

ÆNIGMATICUM Matth.

This singular genus was described by me from some Californian specimens, before the appearance of Mr. Matthews' description in the *Biologia Centrali-Americana*, but I was somewhat at a loss where to place it, hesitating between the Corylophidæ and Latridiidæ.

The following species occurs in great abundance near San Francisco, in moist places among the roots of grasses, and I have also shaken it from small shrubs in the vicinity of Oakland.

Æ. californicum n. sp.—Form rather slender, dark piceous-brown, moderately shining, but without trace of metallic lustre; pubescence cinereous. *Head* small, subtriangular; eyes rather large, at the base, convex, coarsely faceted; front emarginate at each side before the eyes, feebly convex, finely, feebly granulose, very finely, feebly, sparsely punctate, each puncture bearing a small subrecumbent hair. *Prothorax* two and one-half times as wide as the head, scarcely one-third wider than long, widest at the middle; sides broadly, evenly rounded in the apical half, feebly convergent, straight and feebly, minutely serrulate thence to the basal angles, which are slightly obtusæ but not at all rounded; apex and base broadly, evenly and feebly arcuate, the latter distinctly the wider, disk feebly, evenly convex, finely subgranulose, slightly alutaceous, rather coarsely, deeply, but somewhat sparsely punctate, finely sparsely pubescent. *Scutellum* moderate, very strongly transverse, smooth and polished. *Elytra* one-fifth longer than wide, widest near the middle, one-fifth wider and two-thirds longer than the prothorax; sides broadly arcuate; apex angularly emarginate, exterior angles rounded; disk feebly convex, shining, not distinctly alutaceous, very feebly and finely reticulate, finely, feebly and sparsely punctate; punctures rather obsolete, not arranged in well-defined order; pubescence very fine and sparse. *Legs*, antennæ and under surface, except the abdomen, much paler, brownish-testaceous, the latter piceous-black. Length 0.8–0.9 mm.

California (San Mateo and Alameda Cos.).

Differs from the Central American *ptilioides* Matth. in its larger size, more elongate prothorax, and shining elytra and scutellum.

The fifth antennal joint in *ptilioides* is represented on the plate as being slightly elongate; it is correspondingly transverse in the present species, and the joint immediately before the club is strongly transverse and not elongate as in *ptilioides*. The sutural stria is feeble and continuous with the basal stria.¹

BYRRHIDÆ.

LIMNICHUS Latr.

The species of this genus, although but moderately numerous in the United States, appear to be much more abundant and diversified in structure than their European congeners. Our species have never been fully described, and have been somewhat neglected by systematists. The table given by LeConte (Bull. U. S. Geol. Surv., V, p. 515), bears evidence of insufficient observation, and I have not found it of very great service in identifying the species, which in reality are well differentiated. They may be divided as follows into four subgeneric groups, which are perhaps of still greater value. These groups are all distinct from the representatives of the palæ-arctic fauna, there being generally no trace whatever of the antennal groove on the superior surface of the head which is such a singular character of *Limnichus* proper. In all of our subgenera the antennæ are perfectly free in repose, although generally pressed closely against the head, and between its surface and the projecting anterior margin of the prothorax. In the first group (*Eulimnichus*), the last vestige of the groove is visible, being indicated by a minute carina bordering the sides of the head above the eye, but it can be of no use as a shelter for the antennæ in repose:—

Pubescence in a single system, rather sparsely distributed, subrecumbent, robust and aciculate.

Head longitudinally rugulose; basal joint of antennæ in great part concealed by the acute sides of the front, the emarginations at the extremities of the epistomal suture small. Prosternum grooved; hypomera flat, not impressed at the inner angle, having a wide prominent polished bead along the inner margin; margin of the crural excavation acute and cariniform; acute outer edge minutely and abruptly reflexed at apex.

¹ Dr. Sharp, who has been kind enough to compare a specimen of this species with the type of *ptilioides* in the British Museum, writes me that, although the light at the time was very poor, he has no doubt of the distinctness of *californicum*.

- Scutellum distinct, much longer than wide. Elytral punctures generally distinct, always well separated**I**
- Head coarsely, very densely punctate, without trace of longitudinal rugulation; basal joint of antennæ in great part exposed in the large deep emarginations at the extremities of the epistomal suture. Prosternum grooved; hypomera very deeply impressed near the inner obtuse angles; inner polished bead well developed; crural margin acute and cariniform; acute outer edge very gradually, feebly sinuate toward the apex. Scutellum moderate, slightly longer than wide. Elytral punctures generally coarse and densely placed, cribrate**II**
- Head finely, feebly punctate, finely granulose; basal joint of antennæ in great part exposed, the emarginations large. Prosternum not grooved; hypomera flat, not impressed, without trace of an inner polished bead, the crural margin rounded, not distinctly and abruptly defined by an acute edge, the acute outer edge deflexed at apex. Scutellum large, equilatero-triangular. Elytral punctures very minute, entirely filled by the hairs. Antennæ unusually long and slender.....**III**
- Pubescence dual, consisting of very small short confusedly matted and densely-placed hairs near the surface, with fine long erect and much more sparsely-placed hairs interspersed. Scutellum very small, equilatero-triangular, or very nearly so. Prosternum grooved. Crural edge of hypomera acute and cariniform**IV**

The minute reticulation or granulation, especially visible at the sides of the pronotum and on the hypomera and abdomen of groups I, III, and IV, is totally obsolete in group II, and constitutes an important differential character of this section of the genus.

As a generic character, it should be stated that the epipleuræ are, near the apex, deeply grooved; this is more evident in the first three groups, and becomes very feeble or nearly obsolete in group IV.

The species may be distinguished as follows:—

Group I.

EGLIMNICHUS n. subgen.

Pronotum finely reticulate or granulose and more or less alutaceous at the sides.

Elytral punctures rather coarse, deep and very distinct, separated by from once to twice their own diameters.

Prosternal episterna almost attaining the apex**analis**

Prosternal episterna shorter.

Abdomen very minutely, sparsely and feebly punctate, not appreciably more coarsely so near the sides; median groove of pronotum fine but distinct, rather long and terminating at equal distances from base and apex**obscurus**

Abdomen sparsely but more coarsely punctate, very coarsely and deeply so near the sides; pronotal groove very short and nearer the base

californicus

Elytral punctures extremely fine and sparse, separated by from three to five times their own diameters.

Elytra and abdomen alutaceous, the latter excessively feebly, minutely punctate, the punctures very sparse, scarcely visible and not appreciably more distinct laterally; elytral pubescence very minute and sparse.

montanus

Elytra and abdomen strongly shining, the latter very minutely but rather distinctly punctate, the punctures sparse, very slightly larger near the apex, and less distinctly so near the sides.....**perpolitus**

Pronotum highly polished throughout and perfectly devoid of reticulation at the sides.

Punctuation of elytra denser, deeply impressed and very distinct.....**ater**

Punctuation sparser and very feebly impressed, almost invisible near the sides and suture.....**nitidulus**

Group II.

LIMNICHITES n. subgen.

Abdomen densely, coarsely cribrate; punctures of the pronotum very dense.

Larger species, oval; sides distinctly arcuate; punctures of the elytra slightly separated.....**punctatus**

Smaller species, more oblong, with the sides nearly straight in the middle; punctures of the elytra larger, polygonally crowded.....**nebulosus**

Abdomen densely, coarsely cribrate toward the sides, but sparsely and much more finely punctate toward the middle and base; punctures of the pronotum fine in the middle, sparse, those of the elytra rather fine, separated by distinctly more than their own diameters.....**olivaceus**

Abdomen more sparsely punctate; punctures of the pronotum toward the middle sparse and fine; punctures of the elytra very narrowly separated.

perforatus

Group III.

LICHMINUS n. subgen.

Ovate, pointed behind; pubescence rather fine, recumbent, moderately dense, dark brown in color.....**tenuicornis**

Group IV.

LIMNICHODERUS n. subgen.

Abdomen completely devoid of punctures;¹ each elytron with a subapical and two lateral submedian indefinite patches of paler pubescence.

naviculatus

¹ In this subgenus the abdomen is always rendered more or less dull by an extremely minute rugose reticulation. The punctures here referred to are entirely distinct from this; they are deep and perforate, and distributed generally somewhat unevenly over the surface.

Abdomen very finely and sparsely punctate.

Elytral punctures coarse, denser, the pubescence extremely dense and the lustre dull **lutrochinus**

Elytral punctures finer, more sparse, the surface much more shining.

Elytral pubescence very short, even; abdominal punctures visible throughout the width, equal and very sparse throughout..... **seriatus**

Elytral pubescence longer and more shaggy; abdominal punctures completely absent toward the sides of the last three segments, very fine and sparse but visible in the middle toward base; abdomen rather less dull.

ovatus

Abdomen coarsely and densely punctate, especially toward the sides, the punctures rather sparser toward the middle; black, polished; pubescence very easily abraded, less dense..... **punctiventris**

*

L. analis Lec.—Bull. U. S. Geol. Surv., 1879, V, p. 515.—Oval, strongly rounded behind, nearly twice as long as wide, widest at the middle, black throughout, shining; pubescence somewhat dense, moderate in length, subrecumbent, evenly distributed, feebly mottled cinereous and fulvous, the hairs robust and strongly aciculate. *Head* strongly and deeply punctate; punctures longitudinally coalescent, forming fine strong somewhat interlacing rugæ; lateral supraorbital ridges fine and strong. *Prothorax* more than twice as wide as long; sides straight, strongly narrowed from base to apex, the latter two-thirds as wide as the former; basal lobe strong, truncate; surface nearly as in *californicus*, the punctures slightly denser. *Scutellum* three-fourths longer than wide, flat, finely, sparsely punctate; sides and base broadly arcuate. *Elytra* four times as long as the prothorax and scarcely one-fourth wider; surface shining, very obsoletely reticulate; punctures moderate, deep but variolate, separated by about one and one-half times their own widths. *Prosternum* shining, finely and very sparsely punctate, the punctures larger and nearly twice as dense anteriorly; median impressed groove strong, obsolete at anterior fifth; episterna clearly limited within throughout their length, almost absolutely attaining the apex; hypomera flat, not perceptibly impressed at the inner angle, minutely, strongly reticulate, alutaceous, very finely, sparsely punctate. *Abdomen* rather sparsely punctate, finely, strongly granulate-reticulate laterally and toward base, the segments polished toward apex, the fifth polished, deeply, coarsely cribrate, impressed and densely pubescent near the apex. Length 2.3 mm.

Texas; Arizona; California.

The largest species of the genus, related somewhat to *californicus*, but differing in its denser pubescence and punctuation, and in the extent of the prosternal side-pieces; the prothorax at base is relatively wider, the elytra at the humeri not being rather abruptly wider and somewhat prominent as in *californicus*.

L. obscurus Lec.—Proc. Acad. Nat. Sci. Phila., VII, p. 116.—Evenly oval, strongly rounded behind, widest near the middle, convex, shining; pubescence sparse, fine, subrecumbent, short and moderately robust; color black throughout. *Head* finely, longitudinally rugulose, the rugæ rather feeble and confusedly interlacing, the intervals minutely granulose and finely punctate; supra-orbital carinæ very feeble, depressed below the general surface of the front. *Prothorax* much more than twice as wide as long; sides very feebly arcuate; apex nearly three-fourths as wide as the base, the latter broadly and moderately sinuate at each side of the median lobe, the latter moderately prominent; surface minutely reticulate, feebly so in the middle, strongly so and almost granulose laterally, rather distinctly and sparsely punctate. Scutellum of the usual form. *Elytra* with the sides evenly, feebly arcuate and perfectly coarctate with the sides of the prothorax; sculpture nearly as in *montanus*, each puncture surrounded by a series of distinct reticulations, shining; punctures small, not deeply impressed, separated by more than twice their own widths. Prosternum sparsely punctate, the median groove wide, deep and approaching the apical margin to within one-sixth or one-seventh the entire length; episterna clearly limited within throughout, approaching the apex to within one-half their own length, not visibly punctate; hypomera nearly flat, finely reticulate and alutaceous throughout, very finely and sparsely punctate. *Abdomen* finely reticulate, finely and sparsely punctate, the fifth segment impressed and densely pubescent near the apex. Length 2.1 mm.

New York. Cab. LeConte.

Greatly resembles *montanus* in outline and sculpture, but differing in its coarser punctuation, longer and coarser pubescence, and very much longer and wider prosternal groove. It cannot be classed at all with *ater*, with which it was united by LeConte, differing in size, form, sculpture, punctuation and pubescence to a very marked degree.

L. californicus Lec.—Bull. U. S. Geol. Surv., 1879, V, p. 515.—Elliptical, nearly twice as long as wide, strongly rounded at apex, widest at the middle, black, rather strongly shining. *Head* very deeply and rather coarsely punctate, the punctures completely coalescent longitudinally, forming deep and almost regular rugæ. *Prothorax* nearly two and one-half times as wide as long; sides convergent from base to apex and nearly straight; median basal lobe strong, truncate; disk finely granulo-reticulate, strongly so and alutaceous near the sides, very feebly so and polished toward the middle; punctures fine and sparse throughout; median impression feeble, only visible in the basal half. Scutellum nearly two-thirds longer than wide, flat, pointed; sides and base feebly arcuate. *Elytra* nearly four times as long as the prothorax, and, at basal third, nearly one-third wider, polished; reticulations almost obsolete throughout; punctures impressed, moderate in size, distinct, separated by fully twice their own widths. Prosternum finely, very sparsely

punctate, having a wide deeply-impressed groove which becomes obsolete at anterior third; episterna not attaining the apex by nearly one-half their own length, clearly limited within throughout; hypomera flat, strongly reticulate, alutaceous, finely and sparsely punctate, the inner polished marginal bead moderate in width. *Abdomen* finely reticulate, shining; punctures moderate, sparse; pubescence short, setose and sparse, the last segment flat, with a densely pubescent median area. Length 1.7-1.9 mm.

California (Mendocino, Santa Clara and Los Angeles Cos.).

The pubescence is rather short, sparse, pale fulvo-cinereous in color, robust, acutely pointed and subrecumbent. This is a very common species throughout western California.

L. montanus Lec.—Bull. U. S. Geol. Surv., V, 1879, p. 514.—Almost evenly oval, strongly rounded at apex, a little less than twice as long as wide, black throughout, subalutaceous; pubescence very short, subrecumbent, very sparse, cinereous, apparently easily abraded, not conspicuous. *Head* with fine longitudinal rugæ, the concave intervals more minutely and feebly rugulose, and with small distant punctures; lateral carinæ fine but strong. *Prothorax* more than twice as wide as long; sides very feebly arcuate; apex about two-thirds as wide as the base, the basal lobe strong, with the apex sinuous, fitting the base of the scutellum; surface finely granulose laterally, more polished in the middle, rather finely and sparsely punctate; median groove very fine, short. Scutellum one-half longer than wide; sides and base very distinctly arcuate, the surface very minutely and sparsely punctate. *Elytra* rather less than four times as long as the prothorax, and, at basal third, about one-fifth wider; sides very distinctly, evenly arcuate and coarctate with the sides of the prothorax; surface finely, sparsely punctate; punctures round, shallow, not impressed, separated by at least three times their own widths. Prosternum polished, very finely and sparsely punctate, slightly more coarsely and closely so anteriorly; median groove narrow, very deep posteriorly, becoming more feeble anteriorly and obsolete at apical fourth; episterna distinctly limited within throughout, not attaining the apex by about one-third of their own length; hypomera flat, not impressed at the inner angle, finely, strongly reticulate, alutaceous, minutely, sparsely and not distinctly punctate; inner bead strong. *Abdomen* very finely, densely reticulate throughout, minutely and very sparsely punctate; fifth segment with a very small impression just behind the apical margin, the pubescence of the central area coarse, short and not very dense. Length 2.0 mm.

Colorado (La Veta). Mr. Schwarz. Cab. LeConte.

The sculpture of the elytra is peculiar, although merely an intensification of the normal sculpture in this section of the genus. Each puncture is surrounded by a series of six flat reticulations, the series contiguous externally, the outer bounding lines being hexagonal. This is a remarkably distinct species.

L. perpolitus n. sp.—Almost evenly elliptical, rather pointed behind, almost twice as long as wide, black throughout, highly polished. *Head* strongly, longitudinally rugose, the intervals finely, sparsely pubescent and punctate; cariniform upper margins of the eye pronounced, the small dorsal fovea immediately before the eye very deep. *Prothorax* much more than twice as wide as long; sides nearly straight; apex two-thirds as wide as the base, the latter strongly sinuate at each side of the median lobe which is well developed; surface polished, excessively obsoletely reticulate in the middle, strongly so and slightly alutaceous at the sides; median groove short, feeble, broadly impressed; disk very minutely, sparsely punctate and pubescent. Scutellum nearly one-half longer than wide, minutely, sparsely punctate; sides and base arcuate. *Elytra* not quite four times as long as the prothorax; sides very evenly and distinctly arcuate and coarctate with the sides of the prothorax, the humeri not in the least prominent; surface very highly polished; punctures very minute and feebly impressed, separated by from four to five times their own widths; pubescence very fine, short and sparse, silvery-cinereous throughout, not conspicuous. Prosternum finely, very sparsely punctate; median impressed groove nearly equal in width throughout, obsolete at apical fifth or sixth; episterna distinctly limited within throughout, almost attaining the apex; hypomera transversely, feebly convex, finely reticulate, not impressed, very finely, feebly and sparsely punctate throughout, the polished bead forming the inner margin very strong. *Abdomen* finely reticulate laterally toward base, not at all reticulate and polished at apex, finely, sparsely punctate, a small pubescent area near the apex of the fifth segment densely and deeply punctate, not impressed but with the apical edge reflexed. Length 1.7–1.9 mm.

Texas (Austin); New Mexico (Albuquerque). Mr. Wickham.

A very distinct species in its extremely minute, sparse punctuation and pubescence, and highly polished upper surface.

L. ater Lec.—Proc. Acad. Nat. Sci. Phila., VII, p. 117.—Oval, about two-thirds longer than wide, widest near the middle, rather acutely pointed behind, black, polished; pubescence coarse, rather long, subrecumbent, moderately dense, in great part fulvous. *Head* with fine, rather feeble, longitudinal rugæ; intervals finely punctate; pubescence abundant, suberect. *Prothorax* about two and one-half times as wide as long; sides nearly straight; apex two-thirds as wide as the base, the latter deeply sinuate at each side of the moderate median lobe; surface highly polished throughout, without trace of granulation or reticulation even near the sides, rather coarsely and sparsely punctate. Scutellum one-half longer than wide. *Elytra* at the humeri rather abruptly but slightly wider than the prothorax, about four times as long as the latter, and one-fourth wider; sides evenly arcuate; surface rather coarsely and deeply punctate, the punctures impressed and separated by nearly their own widths. Prosternum somewhat coarsely and sparsely punctate, the median groove rather feeble, vanishing at apical fourth; episterna small, deeply, coarsely punctate, not clearly limited within anteriorly, and coming very far

from attaining the apex, the distance thence being equal to their own length; hypomera nearly flat, finely but rather feebly reticulate, polished near the exterior margin, rather coarsely, deeply and somewhat densely punctate, the punctures becoming much finer and sparser near the external margin. *Abdomen* somewhat shining, very finely and sparsely punctate; fifth segment not visibly impressed, the pubescence fine and dense in the middle. Length 1.8 mm.

North Carolina; Florida; Louisiana.

This species very greatly resembles *californicus* in size and outline, but differs conspicuously in the pubescence, which is much longer and more robust; it is also more coarsely and closely punctate, and the sculpture of the pronotum is very different—its strong polish, without granulation, near the sides being a very decisive character.

L. nitidulus Lec.—Proc. Acad. Nat. Sci. Phila., VII, p. 117.—Evenly oval, widest in the middle, nearly twice as long as wide, rather acutely pointed behind, black throughout; pubescence long and robust, subrecumbent, somewhat sparse but conspicuous. *Head* with fine longitudinal rugæ, rather densely pubescent; lateral ridges slightly prominent. *Prothorax* polished throughout, not reticulate near the sides, sparsely and somewhat coarsely punctate; punctures in the middle separated by from two to three times their own widths; median groove very short and feeble. *Scutellum* small, about one-third longer than wide, highly polished and very minutely, feebly and sparsely punctate. *Elytra* not quite four times as long as the prothorax, about one-third wider; sides strongly arcuate, coarctate with the sides of the prothorax; surface polished; punctures rather large but feeble, separated by about twice their own widths. *Prosternum* rather sparsely punctate, coarsely so anteriorly, finely posteriorly; median groove strongly impressed, obsolete at anterior fourth; episterna abruptly limited within throughout, approaching the apical margin to within one-half their own length; hypomera flat, not impressed, finely, strongly reticulate, with a few coarse punctures near the inner marginal bead, elsewhere finely, sparsely punctate. *Abdomen* finely reticulate, finely, sparsely pubescent; punctures moderate in size, rather deeply impressed, somewhat sparse, dense on the last segment which is not impressed, and with the pubescent area not well marked. Length 1.6 mm.

Georgia. Cab. LeConte.

A small species, remarkable for its relatively long, very coarse pubescence, and polished surface. The punctures of the fifth ventral segment are, as usual, very deep and perforate.

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L. punctatus Lec.—Proc. Acad. Nat. Sci. Phila., VII, p. 116.—Oval, strongly rounded behind, about three-fourths longer than wide, widest in the middle; sides distinctly arcuate; black, densely pubescent in feeble mottling

of cinereous and fulvous; integuments polished. *Head* coarsely, very densely, evenly cribrate; supra-orbital carinae almost completely obsolete. *Prothorax* much more than twice as wide as long; sides feebly, evenly arcuate; apex nearly three-fourths as wide as the base, the latter sinuate at each side of the wide and prominent median lobe; surface polished, not at all reticulate at the sides, coarsely, deeply, very densely punctate; hairs very robust, not growing from the punctures but each attached at the margin of a puncture; median groove fine, distinct, slightly nearer the base than the apex. *Scutellum* moderate, very slightly longer than wide, pointed, densely punctate; sides and base strongly arcuate. *Elytra* about three and one-half times as long as the prothorax and scarcely one-fifth wider; sides coarctate with those of the prothorax; surface polished, very coarsely and densely punctate; punctures very deep, perforate and separated by less than one-half their own diameters. *Prosternum* polished, coarsely punctate, the punctures separated by about twice their own widths; median groove long and strong; episterna not distinctly defined anteriorly; hypomera polished throughout, coarsely, very densely punctate, deeply impressed near the inner obtuse angle; inner marginal bead distinct; inner posterior edge forming the margin of the crural excavation abrupt, acute and cariniform. *Abdomen* polished throughout, coarsely, very densely and deeply punctate, the punctures polygonally crowded; fifth segment convex, not impressed, more densely pubescent in the middle; pubescence throughout rather long, fine, and pale silvery-cinereous. Length 1.8 mm.

Pennsylvania—Cab. LeConte. Texas.

A well-marked species of wide distribution, varying considerably in size, but not otherwise to any noticeable extent.

L. nebulosus Lec.—Bull. U. S. Geol. Surv., V, p. 515.—Oblong-oval, strongly rounded behind; sides nearly straight in the middle; black, polished throughout; pubescence rather long, subcrenulent, very robust, somewhat dense, confusedly mottled cinereous and fulvous. *Head* extremely coarsely and densely cribrate, the punctures very deep and polygonally crowded; supra-orbital ridges entirely obsolete. *Prothorax* much more than twice as wide as long; sides distinctly although feebly arcuate; apex nearly three-fourths as wide as the base, the latter sinuate on each side of the median lobe which is moderate; median groove very short, feeble; surface extremely densely, coarsely cribrate, the punctures polygonally crowded, and only two-thirds as wide as those of the elytra. *Scutellum* moderate, very slightly longer than wide, densely, coarsely cribrate, slightly convex; sides and base arcuate. *Elytra* but very slightly wider than the prothorax, extremely densely cribrate, the punctures very coarse and deep, polygonally crowded, the lines of separation being but one-fourth or one-fifth as wide as the punctures. *Prosternum* coarsely but much more sparsely punctate, the median groove very wide and deeply excavated, extending almost to the apical margin; episterna not at all defined toward apex internally, polished, impunctate; hypomera extremely deeply impressed or excavated near the inner obtuse angle, polished, very coarsely, deeply and densely punctate; inner marginal bead very strong

throughout; outer acute edge very feebly and gradually reflexed near the apex. *Abdomen* coarsely, very densely cribrate, the punctures polygonally crowded; pubescence very fine, not conspicuous, that of the pubescent area of the last segment very short and fine, the same segment convex, not impressed. Length 1.7 mm.

California (San Bernardino), LeConte; Texas (Austin) Auct.

The exceedingly coarsely and densely cribrate upper surface, and coarse mottled pubescence will at once distinguish this very interesting species.

L. olivaceus Lec.—Proc. Acad. Nat. Sci. Phila., VII, p. 116.—Oval, convex, in form and color nearly as in *punctatus*; pubescence confusedly mottled cinereous and fulvous, rather sparser than in *punctatus*; integuments polished. *Head* rather coarsely, very deeply and evenly punctate, the punctures dense but distinctly separated. *Prothorax* rather more than twice as wide as long, the basal lobe narrow but well developed, truncate; sides feebly, evenly arcuate; median impressed groove distinct but not extending much in advance of the centre; punctures equal in size to those of the elytra and equally sparse. *Elytra* nearly four times as long as the prothorax; sides distinctly, broadly arcuate, toward base coarctate with those of the prothorax; apex rather acute; surface very evenly, rather sparsely punctate, the punctures round, deep and perforate, separated by one-half more than their own diameters. *Prosternum* shining, deeply grooved, strongly punctate, the punctures separated by their own widths; femora very coarsely, deeply punctate, the metasternum much more sparsely so. *Abdomen* coarsely and very densely punctate toward the sides, much more finely so—the punctures separated by more than three times the distance—toward the middle and base. Length 2.1 mm.

Michigan (Detroit). Mr. Schwarz.

The form described by LeConte as *olivaceus* has given rise to more or less divergence of opinion. Henshaw in his list of the species described by J. L. LeConte (p. 230), states that it is a valid species. Dr. LeConte in his most recently published table of the genus (Bull. U. S. Geol. Surv., V, 1879, p. 515) unites it in synonymy with *punctatus*, and Henshaw in his check-list of North American Coleoptera, appears to coincide with this opinion. I have personally examined the specimen in the cabinet of LeConte which bears the type label, and find that it is absolutely identical with the type of *punctatus*, the punctuation being fully as dense as in that species. Schwarz has taken in abundance at Detroit, Mich., a species—described above—which is allied to, but certainly distinct from, *punctatus*, having the elytral punctuation decidedly sparser but not quite as coarse; it is the opinion of Mr. Schwarz that this is the true *olivaceus*.

I leave this subject, therefore, with the opinion that the specimen labeled *olivaceus* in the cabinet of LeConte, is not the original type, and further that the specimens from Detroit may fairly be assumed to represent that species; the latter seems, at least, a better course to pursue than to give this undoubtedly valid species a new name, based upon an uncertainty of identification.

L. perforatus n. sp.—Form oblong-oval, strongly rounded behind, rather less than twice as long as wide; sides nearly straight in the middle; black; pubescence very coarse, somewhat dense, feebly mottled cinereous and fulvous; integuments polished throughout. *Head* very coarsely, deeply and densely punctate, the punctures on the flat vertical front tending to coalesce in a subtransverse, slightly posterior direction from the median line. *Prothorax* more than twice as wide as long; sides feebly, evenly but very distinctly arcuate; apex more than two-thirds as wide as the base, the basal lobe moderate in width, prominent; median groove short, broadly, feebly impressed and not very distinct; surface rather finely, sparsely punctate, the punctures much less than one-half as wide as those of the elytra, and separated by twice their own widths, coarser and denser toward the sides. *Scutellum* moderate, slightly convex, just visibly longer than wide; sides very strongly arcuate; base feebly so; basal angles rounded; surface rather sparsely and finely punctate. *Elytra* but slightly more than three times as long as the prothorax and scarcely perceptibly wider, very coarsely, deeply and densely punctate, the punctures separated by one-half their own widths. *Prosternum* polished, extremely finely and sparsely punctate throughout; median groove narrowly but deeply impressed, continuous almost throughout the entire length; episterna approaching the apex within two-thirds their own length, abruptly limited within except near the anterior angle, impunctate; hypomera very strongly impressed near the inner angle, polished, rather coarsely punctate, the punctures separated by about twice their own diameters; inner bead strongly developed. *Abdomen* in the middle not very coarsely punctate, the punctures separated by twice their own widths, coarser and slightly closer near the sides, polygonally crowded on the last segment which is not impressed and with the pubescence dense in the middle. Length 1.7 mm.

California (Santa Clara Co.).

This species is distinguished by its remarkably sparse and fine punctuation of the prothorax, above and beneath, for this section of the genus, and contrasting remarkably with the very coarse dense punctuation of the elytra. The abdomen is much more sparsely punctate than in any of the other species of this subgenus.

L. tenuicornis n. sp.—Ovoidal, pointed behind, about three-fourths longer than wide, widest near the middle, black, moderately shining; pubes-

cence moderate in length and density, uniformly dark fulvous throughout. *Head* finely and strongly granulato-reticulate, feebly convex, finely, feebly, somewhat sparsely and not distinctly punctate; epistoma more coarsely and densely so; epistomal suture fine; lateral antennal emarginations deep, exposing the entire basal joint of the antennæ which is large. *Prothorax* much more than twice as wide as long; sides very feebly arcuate; apex two-thirds as wide as the base, the latter sinuate at each side of the basal lobe which is broad and feeble; median groove entirely obsolete; surface minutely reticulate, very strongly so near the sides, excessively obsoletely so in the middle; punctures very fine and sparse. Scutellum large, equilatero-triangular; sides and base straight. *Elytra* scarcely four times as long as the prothorax and about one-third wider; sides strongly arcuate and coarctate with those of the prothorax; surface finely but rather feebly reticulate, the reticulations forming polygonal rings about the punctures, the latter very minute, each in the centre of a small reticulation, and entirely filled by the hair arising therefrom, rather sparsely and evenly distributed. Prosternum transversely convex, without trace of impressed groove, very minutely, sparsely punctate, reticulate laterally; episternum small, not approaching the apex by its own length, very abruptly and clearly limited; hypomera flat, reticulate, not impressed, very minutely sparsely punctate, without trace of inner marginal bead. *Abdomen* finely and strongly reticulate throughout, finely, sparsely punctate, the last segment more densely so; pubescence rather long, coarse and sparse, denser in the middle of the last segment which is not at all impressed, the apex with a broad shallow emargination. Length 1.8 mm.

California (Hoopa Valley, Humboldt Co.).

For the present this species may be considered the type of a subgenus of *Limnichus*, but it is almost unquestionably of higher value, the unimpressed prosternum, long antennæ, and large equilateral scutellum distinguishing it at once from any of the others. If it is considered generically distinct, however, the *lutrochinus* group must also be separated on other, but equally decisive characters.

L. naviculatus n. sp.—Almost evenly oval, about three-fourths longer than wide, acutely rounded but not pointed behind, convex, rufo-castaneous above, slightly paler rufo-ferruginous beneath, feebly shining. *Head* rather convex, excessively minutely, moderately densely punctate. *Prothorax* small, fully two and one-half times as wide as long; sides straight; apex nearly three-fourths as wide as the base; basal lobe rather short and feeble; disk extremely minutely and moderately densely punctate, the median groove completely obsolete. Scutellum small, flat, equilatero-triangular. *Elytra* fully four times as long as the prothorax and one-third wider; sides strongly, evenly arcuate and coarctate with those of the prothorax; surface polished, not reticulate, the larger punctures—bearing the longer hairs—small, perforate, separated by from four to five times their own diameters, the minute

recumbent pubescence easily removable, and leaving merely a minute superficial scar. Prosternum not distinctly punctate, minutely, feebly scabrous and alutaceous, the median groove deep but narrow; episterna transverse, short, the inner marginal line distinct, broadly arcuate; metasternum with the perforate punctures about equal in size to those of the elytra, and separated by about three times their own widths. *Abdomen* dull, excessively minutely, densely pubescent, the perforate punctures completely wanting. *Legs* moderate; intermediate tarsi short, about one-half as long as the tibiae, but with the second joint rather longer than wide. Length 1.5 mm.

Texas. U. S. National Museum.

In its entirely impunctate abdomen this species differs from any other of the subgenus; it somewhat resembles *ovatus*, but differs in its more elongate form and in its coarser elytral punctures, these being about twice as large as in that species. The longer hairs of the elytra in *ovatus* are longer than in *naviculatus*, and the short appressed ones much sparser. In *ovatus* there is no trace of maculation, whereas in the present species the pubescence is paler at three indefinite lateral spots on each elytron, giving, under extremely low power, the appearance of three imperfect transverse fasciæ; in the former the intermediate tarsi are nearly two-thirds as long as the tibiae.

L. lutochinus Lec.—Bull. U. S. Geol. Surv., V. p. 515.—Ovoidal, gradually pointed behind, nearly twice as long as wide, widest near the middle, piceous-brown, very densely pubescent; integuments shining. *Head* finely and very sparsely punctate. *Prothorax* more than twice as wide as long; sides straight; apex two-thirds as wide as the base; median lobe small, distinct; median groove obsolete; surface shining, very feebly reticulate near the sides, not very coarsely, very sparsely punctate, with the interspaces much more minutely, densely punctate. Scutellum small, slightly longer than wide, feebly convex, densely pubescent; sides and base feebly arcuate. *Elytra* about three and one-half times as long as the prothorax; sides distinctly arcuate and nearly coarctate with those of the prothorax, the humeri almost impunctate and slightly, longitudinally tumid; surface rather coarsely, sparsely punctate; punctures perforate and separated by from three to four times their own diameters; interspaces polished, the minute recumbent hairs not arising from definite punctures. Prosternum shining, minutely and not very densely punctate, much more densely punctate and alutaceous anteriorly; median groove fine, extending nearly to the apex; episterna short, broadly triangular, clearly limited within throughout, the inner margin arcuate; hypomera flat, not impressed, minutely, densely reticulate, dull, minutely, densely pubescent, not visibly punctate; inner bead wide, flat, polished; edge of the crural cavity acute and cariniform. *Abdomen* very dull, rather finely, very sparsely punctate, the interspaces excessively minutely, densely punctate.

tate and pubescent; last segment not impressed, having longer and more conspicuous pubescence. Length 1.5 mm.

Texas. Cab. LeConte, Belfrage and Schwarz.

The dual nature of the pubescence has been referred to as a group character, and has not been mentioned in the description. The longitudinal groove in the elytral epipleuræ near the apex is very fine, and less developed than in group I.

L. seriatus n. sp.—Oval, convex, about three-fourths longer than wide, rather gradually pointed behind, castaneous above, rufo-ferruginous beneath, feebly shining. *Head* convex, extremely minutely and rather densely punctate. *Prothorax* a little more than twice as wide as long; sides nearly straight; apex fully three-fourths as wide as the base; basal lobe small, rather feeble; disk excessively minutely, feebly, rather densely punctate, the median groove completely obsolete. *Scutellum* very small, slightly longer than wide, acutely pointed; sides straight; surface minutely, feebly reticulate. *Elytra* four times as long as the prothorax and nearly two-fifths wider; sides feebly arcuate anteriorly and not coarctate with those of the prothorax, the width at the humeri being distinctly greater than the base of the latter; surface polished, not reticulate, very minutely punctate, the punctures about as large as those of *ovatus*, and separated by from four to five times their own diameters, somewhat unevenly distributed. *Prosternum* rather dull but not punctate, the median groove fine but deep and distinct; *metasternum* strongly and sparsely punctate, the punctures decidedly larger than those of the elytra, and separated by about three times their own widths. *Abdomen* finely, sparsely punctate, the punctures perforate, scarcely as large as those of the metasternum, but rather larger than those of the elytra, separated by from four to five times their own widths; fifth segment entirely impunctate, except a single line of punctures along the base. *Intermediate tarsi* nearly two-thirds as long as the tibiae, the joints two to four very short, transverse and oblique, almost exactly equal. Length 1.2 mm.

Florida. Mr. Schwarz.

The large hairs of the elytra are but slightly longer than the fine short subappressed ones, and are entirely inconspicuous; there are, however, on each elytron four series of long erect white setæ which are very widely spaced; these contrast strongly with the general vestiture, when viewed under light coming horizontally along the axis of the body and from the front. I have not noticed these setæ in any other species, although they probably exist, and are simply more prominent in the present case because of the extraordinary shortness of the general pubescence. This last character will easily distinguish *seriatus* from *ovatus*. The elytral pubescence is fulvous in color and entirely devoid of maculation.

L. ovatus Lec.—Proc. Acad. Nat. Sci. Phila., VII, p. 117.—Evenly ovate, rather acutely pointed behind; sides strongly arcuate; piceous-black above, slightly paler, piceous, beneath; legs and antennæ dark rufo-testaceous; integuments polished throughout above; pubescence very conspicuous, pale brown. *Head* convex, very finely, sparsely punctate, polished; epistomal suture deep and strong; epistoma scabrous and dull. *Prothorax* two and one-half times as wide as long; sides straight; apex rather more than two-thirds as wide as the base; basal lobe small and feeble; surface polished, slightly scabrous and reticulate at the sides near the apical angles, finely, sparsely punctate, the intervals excessively minutely and feebly punctate; median groove obsolete. Scutellum very small, equilatero-triangular, flat; sides and base straight, the former arcuate near the base. *Elytra* nearly four times as long as the prothorax and one fourth wider; sides evenly rather strongly arcuate and coarctate with those of the prothorax; humeri not distinctly tumid: surface polished, very finely, sparsely punctate; punctures perforate, distant by from four to six times their own diameters; interspaces as in *lutrochinus*. Prosternum shining behind, dull near the apex; median groove fine, distinct, attaining neither the anterior nor posterior margin; episterna very short and broad, polished, clearly limited, the inner margin strongly arcuate; hypomera flat, not impressed, dull, not visibly punctate, inner polished bead flat, short, the margin of the crural excavation finely acute and cariniform, and much longer than the beaded side. *Abdomen* strongly opaque, minutely, sparsely punctate; last segment with scarcely denser pubescence. Length 1.3 mm.

Southern States. Cab. LeConte.

The systematic relationship of this small species may readily be seen from the table; it is more convex and less oblong than *seriatus*, with the sides more strongly arcuate, and the prothorax relatively narrower and more strongly narrowed from base to apex.

L. punctiventris n. sp.—Evenly oval, two-thirds longer than wide, convex, black above, dark rufous beneath, rather strongly shining. *Head* convex, extremely minutely, somewhat densely punctate. *Prothorax* small, more than twice as wide as long; sides nearly straight; apex three-fourths as wide as the base, the basal lobe small, not very prominent; surface very minutely, feebly punctate; pubescence rather sparse; median groove obsolete; along the apical margin there is a series of minute granulations, in advance of which the marginal surface is thin, semicoriaceous and polished. Scutellum small, equilatero-triangular; sides straight; surface polished. *Elytra* fully four times as long as the prothorax; sides distinctly arcuate and almost coarctate with those of the prothorax, the humeri being but just visibly prominent; disk very minutely punctate, the punctures unevenly distributed, and separated by from three to six times their own widths, but generally about four, becoming much coarser but not denser toward the sides; minute pubescence rather long, coarse and not extremely dense, the longer hairs sparse, although decidedly longer. Prosternum feebly shining, more polished poste-

riorly ; median groove very fine but distinct and almost entire ; metasternum shining, very finely, sparsely punctate, the punctures perforate, not larger than those of the sides of the elytra, but rather coarser and denser laterally, separated by from three to five times their own widths. *Abdomen* more coarsely and very deeply punctate, the punctures very dense laterally, where they are separated by about their own widths, rather finer and distinctly sparser toward the middle, the fifth segment almost completely impunctate except near the base. Length 1.3 mm.

Florida. Mr. Schwarz.

The rather shining surface, black color and coarser, very dense abdominal punctuation will render the identification of this species very easy. The series of longer coarser setæ on the elytra, mentioned under *seriatus*, are represented here by the marginal series only, the others being not distinctly traceable.

PHYSEMUS Lec.

Regarding the relationship of the three genera *Bothriophorus*, *Physemus* and *Ditaphrus*, the following observations may prove interesting.

In the remarks appended to the original description of *Ditaphrus* (Bull. Cal. Acad. Sci., II, pp. 250-253), the reasons were given for the separation of the genus from *Physemus*; they were based solely upon the original description of the latter as given by Dr. LeConte. After the publication of *Ditaphrus* the suspicion of its identity with *Physemus* continued to grow upon me, until I determined to discover the truth if possible by actual observation. I accordingly made a journey at considerable expense from San Francisco to Yuma, incidentally for the purpose of collecting Coleoptera, but especially to rediscover the species *Physemus minutus*. Knowing the haunts of *Ditaphrus scymnoides* in Texas, I did not have to search long before finding LeConte's species in numbers, moving slowly over the surface of moist adobe mud, under débris of fallen leaves. An examination at once revealed the fact—as I had anticipated—that the two genera are identical in every point of structure, and that the species also are the same, although presenting very slight differences in size and vestiture.

Wishing to carry the investigation a step further I have procured from M. Desbrochers des Loges, a specimen of the European *Bothriophorus Muls.*, and find on examination that, while resembling *Physemus* very closely, it differs decidedly in antennal structure.

If the student will have before him the figure of the antenna of *Physemus* (l. c. plate), he can more readily appreciate the differences as indicated in the following description :—

First six joints somewhat similar to the same in *Physemus*. Seventh joint slender, cylindrical, nearly twice as long as wide; eighth just visibly wider than the seventh and one-half as long, triangular, the vertex of the angle directed anteriorly, the posterior side straight; ninth triangular, transverse, the angle on the anterior side, the posterior side nearly straight, scarcely longer and one-half wider than the eighth; tenth almost evenly obtrapezoidal, scarcely longer than the ninth but distinctly wider, two-thirds wider than long, closely joined to the eleventh throughout the width; eleventh ovoidal, pointed, slightly wider than the tenth, two-thirds longer than wide, slightly longer than the two preceding joints combined and more densely pubescent.

It will be seen, therefore, that the two genera are quite distinct in antennal structure, the one having a two-jointed, and the other a three-jointed club.

The species—*B. atomus* Muls.—is somewhat smaller and more finely and very much more feebly punctate than *Physemus minutus* Lec.

PARNIDÆ.

THROSCINUS Lec.

Elongate-elliptical, convex, punctate, pubescent. Head deflexed; eyes and labrum visible in repose; epistomal suture fine, straight; epistoma transversely truncate at apex; labrum large, transverse, convex, broadly, feebly sinuate at apex; antennæ inserted at the sides of the front, base not concealed, 11-jointed; basal joint twice as long as the second and much more robust; last six joints broader, forming a very elongate, slender, perfoliate club; last joint of the maxillary palpi elongate, slender, acuminate, with a minute apical process. Prosternum large, truncate anteriorly; process very wide, with two fine lateral carinæ which extend diverging anteriorly for more than one-half the distance from the coxæ to the anterior margin, not grooved in the middle, the apex broadly arcuate, received in a very broad shallow emargination of the mesosternum; the latter very short, widely separating the coxæ; metasternum large; episterna narrow; posterior coxæ widely separated, flat above, sulcate beneath, triangular, prominent internally, only extending to the metasternal epimera. Anterior and intermediate legs rather short, simple; tarsi all moderate in length, free, slender; four basal joints short, subequal; fifth as long as the three preceding together. Epipleuræ very narrow posteriorly, broader, flat and sinuous toward base, not at all excavated or impressed for the intermediate femora, the basal margin closely fitted throughout its width to the hypomera; the latter wide, flat, separated from the prosternal side-

pieces, the coxæ and trochantin by a fine, nearly straight suture which, anteriorly, becomes a deep groove for the reception of the antennæ, and which is the posterior prolongation of deep grooves beneath the eyes. Prothorax fitted to the elytra throughout the width of the latter, with the basal angles acute and slightly produced posteriorly.

This genus was founded by LeConte upon the Californian representative *T. Crotchii*, which is more slender than the present, more finely and much more densely punctate and pubescent, the hairs being somewhat confusedly matted as in *Heterocerus*. The above diagnosis was drawn from the Texan species which seems to be identical in generic characters.

T. politus n. sp.—Black above; legs and under surface rufo-piceous; abdomen paler; antennæ black; integuments subalutaceous beneath, very highly polished above, rather coarsely and sparsely pubescent; hairs short, erect, denser and finer on the head. *Head* moderate in size, deeply seated in the prothorax; front vertical in repose, feebly, evenly convex, very finely and feebly punctate; eyes large, rather prominent, entirely exposed, on the sides just before the prothorax; antennæ slightly longer than the width of the head, slender; joints three to five very slender, the third almost as long as the fourth and fifth together. *Prothorax* widest at the base, where it is two-thirds wider than at apex; sides evenly, feebly arcuate; base transverse, rather abruptly and strongly arcuate in the middle third; posterior angles very acute, slightly produced; apex broadly, feebly arcuate; disk nearly twice as wide as long, broadly, very evenly convex, finely, sparsely punctate, the interspaces extremely minutely and feebly punctate. *Scutellum* very distinct, flat, polished, impunctate, ogival, pointed, as long as wide. *Elytra* at base equal in width to the prothorax; sides parallel, feebly arcuate for two-thirds the length from the base; together gradually rounded behind, acute at the apex; disk evenly convex, nearly three times as long as the prothorax, very coarsely and strongly punctate; punctures impressed, evenly distributed, obsolete at base; interspaces more than twice as wide as the punctures, not at all punctate. Under surface very finely, densely pubescent, the hairs short and closely recumbent; abdomen extremely minutely granulose, not punctate; segments decreasing very slightly in length to the fourth, fifth slightly longer; surface convex; sutures feeble, straight. Length 1.7–2.0 mm.

Texas (Galveston).

A very good series of this interesting species was obtained from the vegetable detritus, covering the interior line of sand dunes, along the ocean beach.

LUCANIDÆ.

PLATYCERUS Geoff.

A sexual character, which seems to have escaped observation, exists in perhaps its greatest development in *quercus*. It will be seen that in this species, the posterior tarsi of the female are much shorter than in the male. In *oregonensis* the same condition holds, but to a less-marked degree, and in *Agassii* the character completely disappears, the tarsi in both male and female being very long and slender, with the fourth joint twice as long as wide. The type of *californicus* is a female, and, as the posterior tarsi are extremely short, relatively more abbreviated even than in the female of *quercus*, with the fourth joint fully as wide as long, it is probable that the male, also, has a shorter tarsus than *Agassii*, and that the species is to be associated with *quercus* and *oregonensis*, rather than with *Agassii*.¹

Through the kindness of Mr. J. J. Rivers of Berkeley, California, who has made the study of this genus somewhat of a specialty, I have been permitted to examine a larger series than has been hitherto available to me, and find that there are several species similar to *Agassii* in having the mandibles small and inconspicuous in the males, and the hind tarsi nearly as long as the tibiae. The series alluded to affords sufficient material for a tolerably complete study, and consists of twelve specimens of *Agassii*, three of *pacificus*, and two of *parvicollis*. These three species may be defined as follows, the characters given referring to the male only:—

Sides of the prothorax—viewed vertically—distinctly subangulate.

Pronotum finely, densely punctate; antennal club much longer than the funicle, the last joint strongly asymmetric, the longest dimension being in a direction oblique to the axis of the club, and very much exceeding the width; sixth joint of funicle strongly produced anteriorly; fifth joint of hind tarsi as long as the first and second combined; elytra equal in width to the prothorax.....**Agassii**

¹ I have recently had occasion to inspect the original female type of *Agassii* in the museum at Cambridge, Mass., and find that the specimens heretofore regarded by Mr. Fuchs and myself as representing that species, were correctly identified. The type, apart from its slightly paler color due to immaturity, does not differ in the slightest degree from the average female, and the punctuation of the pronotum is equally dense.

Pronotum much more coarsely and sparsely punctate; antennal club equal in length to the funicle, the last joint much less, although distinctly, asymmetric, slightly longer than wide; sixth joint of funicle just visibly more prominent anteriorly; fifth joint of hind tarsi distinctly longer than the first two combined; elytra at apical two-fifths fully one-fourth wider than the prothorax; color pale, brown.....**parvicollis**

Sides of prothorax—viewed vertically—broadly, evenly arcuate, subangulate when viewed laterally, the surface much more convex and declivous at the sides; pronotum finely and very sparsely punctate; antennal club slightly but distinctly longer than the funicle, the last joint wider than long; sixth joint of funicle not at all prominent anteriorly; elytra equal in width to the prothorax; surface highly polished; color deep black.....**pacificus**

P. parvicollis n. sp.—Form slender, rather depressed; sides parallel; dark reddish-brown, somewhat bronzed; head and pronotum darker; legs throughout dark brown; integuments polished. *Head* rather small, coarsely, deeply and rather densely punctate; front with several long coarse fulvous setæ; mandibles small; antennal club about equal in length to the funicle; last joint very slightly oblique, slightly longer than wide. *Prothorax* small, widest very near the middle where it is nearly twice as wide as long, and where the sides are distinctly angulate from above, the angle narrowly rounded, apex broadly, very feebly emarginate, slightly narrower than the base; the latter transversely truncate; angles slightly prominent, acute, not at all rounded; sides nearly straight anteriorly and posteriorly, rather strongly convergent in both senses, feebly sinuate near the base; disk broadly, feebly convex, rather broadly but not strongly reflexed at the sides, coarsely and strongly punctate, the punctures rather sparse in the middle, with a narrow, incomplete, impunctate median line, dense toward the sides, except in the reflexed portion, where they are very sparse and coarser. *Scutellum* much wider than long, parabolic, very sparsely, coarsely punctate at base. *Elytra* at base fully as wide as the prothorax; sides parallel, distinctly arcuate behind, nearly straight and feebly divergent in the basal fourth; together evenly and rather strongly rounded behind; disk transversely and moderately convex, four-fifths longer than wide, three and one-third times as long as the prothorax, widest at two-fifths the length from the apex where it is one-fourth wider than the latter; striæ nearly equidistant, feebly impressed, rather finely, deeply punctate, the punctures closely approximate; intervals feebly convex, sparsely creased, finely, unevenly and sparsely punctate. *Legs* slender; posterior tarsi just visibly shorter than the tibiae. Length 10.3 mm.; width 4.0 mm.

California.

Readily distinguished from *Agassii* and *pacificus* by the pale color, small prothorax which is here much narrower than the elytra, and by the great relative length of the latter. The type is a male; the antennal club being relatively very much shorter than in either of the species mentioned. In *Agassii* the funicle is three-fifths as

long as the club, in *pacificus* three-fourths, and in *parvicollis* about equal in length, the comparisons being made from males. In the female of *Agassii* the club is small and very distinctly shorter than the funicle.

P. pacificus n. sp.—Oblong, rather convex, polished, black; sides parallel and nearly straight. *Head* moderate in size, sparsely, coarsely punctate; antennal club distinctly longer than the funicle, last joint almost symmetrical, distinctly wider than long. *Prothorax* widest at one-third the length from the base, where it is two and one-half times as wide as the head, and two-thirds wider than long; sides—viewed vertically—broadly rounded, sinuate near the basal angles which are acute, not rounded, and slightly prominent; apex slightly narrower than the base, broadly and feebly emarginate, the latter transversely truncate; disk broadly convex, rather broadly and strongly reflexed at the sides, very sparsely, finely punctate in the middle with an impunctate median line; punctures much denser laterally; in the reflexed portion along the margin they are again sparser but much coarser. Scutellum ogival, slightly wider than long, punctate at base, impunctate in the apical half. *Elytra* at base about as wide as the prothorax; sides parallel, distinctly arcuate posteriorly, straight in the basal third or fourth; together broadly rounded behind; disk transversely, rather strongly convex, two and three-fourths times as long as the prothorax; striæ feeble, rather closely punctate, equidistant; intervals very feebly convex, creased, more finely and very sparsely punctate. *Legs* black; tarsi very slightly paler toward apex, the posterior nearly as long as the tibiæ. Length 10.0 mm.; width 4.2 mm.

California.

This species is easily distinguished from *Agassii* by its very sparse punctuation and form of the prothorax, the sides of the latter being much more broadly rounded, when viewed vertically, than in *Agassii*, although when viewed obliquely they are subangulate.

SCARABÆIDÆ.

ACOMA n. gen. (Melolonthinæ).

Clypeus rather prolonged, concave; apex with a small median notch and feebly bidentate, strongly inflexed for a great distance beneath, the labrum entirely connate and obsolete, not visible except as a minute reflexion of the infraclypeal surface. Mentum minute, very narrow, elongate, nearly flat. Maxillæ large, the palpi rather large; basal joint small; second and third subequal, longer than wide; fourth as long as the preceding together, wider, elongate-oval, with a broad shallow groove on the outer face throughout the length, the apex with a minute oval impressed area. Labial palpi very minute. Eyes large; inferior portion much larger than the upper, separated

beneath by much less than their own width. Antennæ nine-jointed; basal joint as long as the next three together, slender at base, strongly inflated toward apex, the apical margin fringed with a single row of long erect setæ; second wider than long, narrower than the first, strongly narrowed at base; third to fifth subequal in length, longer than wide, subcylindrical and sub-anchylosed; sixth very short, strongly transverse, slightly wider; seventh to ninth forming a very large club, twice as long as the stem—measured in a direction perpendicular thereto—strongly arcuate toward apex, and, in shape and relationship with the stem, exactly as in *Polyphylla*. Vertex with a fine longitudinal ridge over each eye; clypeal suture obsolete except near the sides where it is fine and transverse. Anterior margin of the pronotum with a broad flat bead throughout; posterior margin with a very much finer one, which becomes abruptly very fine in the middle and also laterally. Scutellum rather large, ogival. Elytra projecting well behind and partially concealing the pygidium. Anterior coxæ large, transverse, strongly conical and prominent internally; prosternum very short before them, the anterior margin broadly bisinuate between the strongly advanced and acute anterior angles of the pronotum; hypomera rather wide, nearly flat and almost horizontal; femora large, broad, flattened, posterior very large; anterior tibiæ with a small acute internal spur near the apex, two external obtuse teeth, and a prolonged apical process which is slightly dilated toward apex; middle and posterior tibiæ robust, festooned in the middle with an oblique girdle of spinules, obliquely truncate and dilated at apex, with a fringe of short robust spinules, and two long terminal spurs; tarsi very long and slender, twice as long as the tibiæ; joints very long, slender and cylindrical; basal joint longest; claws very slender, long, finely acuminate, very feebly arcuate, equal and very minutely carinate internally at base. Metasternum very obliquely truncate at the sides behind, in the middle longer than the abdomen; episterna short and broad. Abdomen extremely short in the middle, broad, consisting of five segments; sutures distinct throughout the width; first segment almost completely covered by the very large posterior coxæ. Pygidium moderate, about as long as wide, feebly convex, rounded at apex, very feebly and inwardly oblique.

The very long slender tarsi and nine-jointed antenna seem to point at first to a relationship with *Macrodactylus*, but the very large mentum, feebly inflexed clypeus and abdominal structure of the latter prohibit any such association. From the *Sericini* it differs in its very minute elongate mentum, this organ in that group being large and transverse. From the *Dichelonychini* it differs in its minute mentum and obsolete labrum, and from all these in the form of the labial palpi. The latter are extremely minute, scarcely visible, and closely approximate, the two basal joints very small, sub-globular, the third longer than the first two together, elongate-oval.

In the genus *Podolasia* the clypeus is formed nearly as in *Acoma*, but is slightly more developed above, and inflexed for a much shorter

distance beneath. The labial palpi are large and very evident; the antennæ are nine-jointed, with a small robust three-jointed club, and with the second joint large and globular; the anterior tibiæ are devoid of internal spine, and the long apical process is acute and strongly excurvate. The claws are long and slender, with a small longitudinal carina internally at base, but not properly toothed. The first four abdominal segments are connate, the sutures excessively feeble in the middle, but not entirely obliterated, the fourth suture wide and membranous.

I think, therefore, that this interesting genus may be placed for the present near *Podolasia*, but with the assumption that it constitutes a connecting bond with some other group in its almost perfectly free abdominal segments, extremely minute labial palpi, and greatly developed antennal club of the male.

In *Chnaunanthus* the ventral sutures are absolutely obliterated in the middle, and this genus is therefore a more highly specialized representative of the group *Oncerini*, than either *Podolasia* or *Acoma*.

A. brunnea n. sp.—Form oblong, the sides nearly parallel, moderately convex, dark reddish-brown throughout; head and prothorax almost glabrous, but rather densely fimbriate with long erect hairs at the sides; elytra sparsely clothed with rather long erect hairs, which are longer and more conspicuous at the sides; under surface bristling with long slender sparsely placed hairs, especially conspicuous on the fimbriate femora. *Head* coarsely, very densely and deeply rugoso-punctate, the clypeus, which is nearly as long as the remainder of the head, coarsely, deeply and sparsely punctate. *Prothorax* four-fifths wider than long; sides strongly rounded just behind the middle, thence convergent and feebly sinuate to the acute apical angles, broadly rounded to the base, the basal angles being broadly rounded and obsolete; base broadly, very feebly arcuate, abruptly distinctly and more strongly so opposite the scutellum; apex broadly emarginate, bottom of emargination broadly bisinuate; disk moderately convex, polished, feebly impressed along the median line except near base and apex, finely, sparsely punctate; punctures entirely wanting in a broad median line, and also along the basal margin. Scutellum almost impunctate. *Elytra* widest in the middle, slightly longer than wide, very slightly wider than the prothorax; sides parallel, feebly arcuate, together broadly, obtusely rounded behind; humeri slightly prominent; disk feebly convex, strongly so at the sides, finely, feebly and unevenly striate; striæ more approximate and very much confused at the sides, where the surface is distinctly rugulose; striæ very finely and approximately punctate; intervals each with a very uneven single line of larger, more distant punctures. Length 5.0–5.5 mm.

Texas (El Paso). Mr. G. W. Dunn.

This very anomalous little beetle apparently lives in flowers or on plants; the three specimens before me are males; I have not seen the female.

POLYPHYLLA Harris.

The American species of this genus appear to agree very well with the European, and differ principally in their shorter, more robust legs. The following species belongs near *decemlineata*, and may be at once interpolated in the table given by Dr. Horn (Trans. Am. Ent. Soc., IX, p. 73).

P. speciosa n. sp.—Elongate-oval, convex; prothorax trivittate; lateral vittæ interrupted.

Female.—*Head* much wider than long; clypeus two and one-half times as wide as long; sides parallel, feebly arcuate; apex broadly and very feebly bisinuate, the lateral angles acute, more prominent and more strongly reflexed; front coarsely and very densely punctate, rather sparsely clothed with short erect hairs, and squamose with large pointed scales toward the eyes and along the margins of the clypeus; antennæ rather robust; basal joint pyriform, robust, as long as the next two together; second and third elongate, the latter much the longer, fourth obconical, slightly produced inwardly at apex, feebly transverse; club feebly arcuate, six-jointed, first narrower and more acuminate than the others, pointed, and but little more than one-half as long, remaining joints equal in length and nearly as long as the entire stem including the basal joint. *Prothorax* widest just behind the middle, narrowed rather rapidly thence to the apex, the latter about two-thirds as wide as the base, broadly emarginate and feebly bisinuate; base broadly arcuate, more strongly so in the middle; sides subangulate, angle narrowly rounded, thence just visibly arcuate to the apical angles, and extremely feebly sinuate to the base, broadly and very feebly subcrenulate throughout; basal angles obtuse, not at all rounded; disk convex, with a very small feeble impression near each lateral edge at the middle of the length; vittæ white, very dense, the lateral interrupted anteriorly, remainder sparsely covered with large elongate pointed yellow scales, which are denser near the basal margin except in the middle; surface anteriorly with a very few short erect hairs; punctures large, shallow, round and variolate, rather densely but unevenly distributed, each enclosing a scale. Scutellum broadly parabolic, vittate. *Elytra* three-fifths longer than wide, in the middle one-third wider than the prothorax; sides parallel and feebly arcuate, subtruncate behind; humeri slightly tumid; apical umbones large and feeble; each elytron with three broad dense white vittæ, and a fourth very narrow and interrupted between the second and third from the suture; third vitta abruptly terminating near the apex, feebly and evenly arcuate throughout, first and second meeting on the apical umbo, the first irregular toward base; suture narrowly vittate, the vitta continuing

to the apex; intermediate surface finely, sparsely punctate, and covered sparsely with moderate pointed yellow scales. *Pygidium* slightly wider than long, triangular; sides equally arcuate; surface feebly convex, slightly impressed at the sides, sparsely clothed with elongate whitish scales which are dense along the base, and much sparser in a very narrow median line; surface also very sparsely and finely pubescent. *Abdomen* with small robust whitish scales, much denser along the apical margins of the segments, and also with very sparse erect pubescence. Length 36.0 mm.

Colorado (exact locality unknown—♀); New Mexico—♂.

This fine species is easily distinguishable by its antennal structure from any other in the genus. The last joint of the maxillary palpi is very feebly lunate, and is pointed at apex. The anterior tibiae are robust, the outer teeth strong, the one nearest the base very broad, obtuse, and feebly developed.¹

¹ I take the present opportunity to describe an interesting new species, received a short time since from Central America. The description refers to the female.

P. concurrens n. sp.—Form nearly as in *decemlineata*, pale brownish-rufous. Clypeus truncate, broadly arcuate in the middle; angles right, not rounded, but also not prominent, its surface feebly and very narrowly reflexed at the apical margin, having a few widely scattered, coarse, squamigerous punctures; front immediately behind the suture abruptly, coarsely, extremely densely and deeply punctate, the punctures in mutual contact, the occiput again abruptly totally impunctate; antennae moderate, club as long as joints two to four combined; sixth joint rather less than one-half as long as the remainder, which are equal. *Pothorax* nearly as in *decemlineata*, but very much more sparsely punctate, the median line very deeply impressed, and the vittae narrow; scales large and robust. Scutellum polished, with a narrow median vitta. *Elytra* with ten very narrow, densely squamose vittae, the second from the lateral margin long, extending to apical third, but very widely interrupted; intervals extremely sparsely squamose, the scales smaller and narrower than those of the vittae. Length 25.0 mm.; width 11.0 mm.

Honduras. (One specimen.)

Although resembling *decemlineata*, this species is smaller, less robust, and differs greatly in the form of the pygidium, which is slightly longer than wide, transversely convex, and extremely sparsely squamose, a narrow median line entirely glabrous. The anterior tibiae are tridentate, the basal tooth very broad and feebly developed. The front and vertex in this species, and also in *speciosa*, are very much more densely and coarsely punctate than in *decemlineata*, where the punctures are separated by their own widths. All comparisons have been drawn from the female, which is the more constant sex.

THYCE Lec.

The single species, which has been regarded as the type of this genus, has hitherto been represented by a single female, and the recent discovery of the male by Mr. Dunn at El Paso, Texas, indicates the absence of generic difference between it and most of the Californian species separated as *Plectrodes*.¹ The structure of the anterior coxæ is identical, and the teeth of the tarsal claws are quite plainly unequal, to fully as great a degree in fact in *T. squamicollis*, as in many of the recognized species of *Plectrodes*. Our species may be separated as follows, the characters referring to the males:—

Fourth joint of the maxillary palpi one-third as long as the antennal club.²

Carpenteri

Fourth joint three-fifths as long as the antennal club; elytra nearly glabrous.

squamicollis

Fourth joint three-fourths as long as the antennal club.

Elytra moderately densely pubescent; last palpal joint oval, with the groove almost evenly elliptical³.....**palpalis**

Elytra extremely densely clothed with very minute, recumbent, squamiform hairs; last palpal joint robust, the groove widening toward base.

pulverea

Fourth joint just visibly shorter than the antennal club, the apex acute and deflexed.....**fossiger**

Fourth joint two-thirds longer than the antennal club.....**Harfordi**

In *Carpenteri* and also in *Plectrodes pubescens* the excavated groove in the fourth palpi joint is narrow, shallow and feeble, and is much shorter than the joint; in the remainder it is narrow, very deep, and extends throughout the length.

The females are much less abundant than the males, and differ considerably. The fourth palpal joint is small and more uniform in size with reference to the antennal club, and, although impressed externally, the groove is shallow and only partial, even in the

¹ The genus *Plectrodes* is represented only by the original *P. pubescens* of Horn. In this species the anterior coxæ do not differ in form from the same members in *Thyce*, but the abdominal segments are much shorter, and are almost completely free, requiring but slight force to break them asunder. In all the other species the ventral segments are long and connate, to absolutely the same degree as in *Thyce squamicollis*, being indicated only by feebly impressed lines. The genus *Plectrodes* should therefore be placed in the Melolonthini, where it will constitute one of the transitions to the Macrophyllini.

² Horn, Trans. Am. Ent. Soc., VIII, p. 146, and Pl. III, fig. 7. ³ Ibid.

females of such strongly developed forms as *pulverea* and *Harfordi*. The antennal club is much shorter, more compact and oval. The anterior tibiæ are stouter and with more strongly developed external teeth. The vestiture is very much shorter, finer, and sparser, so that the general color is darker.

The species of Thyce are nocturnal, being abundantly attracted by bright lights at certain seasons of the year.

T. squamicollis Lec.—The female of this species is much larger than the male, but is almost precisely similar in vestiture. The pronotum in both sexes is very sparsely clothed with small, closely recumbent, squamiform hairs which are slightly denser along a narrow median line, as is usual throughout the genus; the lateral vittæ are, however, not definite. The name is therefore somewhat inappropriate. In the male the antennal club is nearly three-fourths as long as the stem, and in the female only one-half as long as the latter, oval and more compact.

Although the upper surface is more than usually glabrous, the long dense silken pubescence of the under surface is as well developed as in any other species.

T. pulverea n. sp.—Form elongate-oval, convex; elytra and abdomen dark reddish-brown; head and prothorax darker, piceous, the latter clothed moderately densely with small robust recumbent hairs, and longer erect pubescence; elytra and abdomen very densely covered with minute, recumbent, squamiform hairs; remainder of the under surface with long very dense silky pubescence; mesosternal parapleuræ, hypomera, and exposed surface of maxillæ devoid of long erect pubescence, but having whiter, dense and recumbent, squamiform hairs, a small indefinite spot at the sides of each abdominal segment also whiter and denser, remaining vestiture cinereous. *Head* wider than long; clypeus concave, truncate and very feebly sinuate in the middle, the angles slightly rounded, the base very slightly narrower; antennal club as long as the stem; last joint of the maxillary palpus nearly one-half longer than the preceding together, and fully three-fourths as long as the antennal club, rather robust, apex oblique but not deflexed and with a small circular truncation, the groove very deep, widening toward base, entire. *Prothorax* one-half wider than long; sides broadly angulate, the angles rounded; basal angles obtuse and rounded, apical obtuse but not rounded; apex very feebly emarginate, one-half as wide as the base, the latter broadly angulate, the angle broadly rounded; disk convex, finely, feebly and densely punctate. Scutellum white, more densely pubescent. *Elytra* nearly one-half longer than wide, widest near the middle, nearly one-third wider than the prothorax; sides very feebly arcuate; apex broadly sinuate; humeri slightly tumid; apical umbones very feeble; disk with the most feeble and indefinite traces of fine costæ, very finely, feebly and densely punctate. *Pygidium* one-third wider

than long, feebly convex, very minutely and densely punctate and pubescent. *Legs* moderate; femora fringed with fine erect pubescence, the flat surfaces with very small, recumbent, squamiform hairs not very densely placed; tarsi as long as the tibiae; claws arcuate, finely attenuate; tooth of anterior claw of anterior tarsi erect, near the base, slightly arcuate, stout and scarcely one-third as long as the remainder; tooth of the posterior claw, less than one-half as large, projecting but slightly above the basal carina; proportions in the other claws nearly similar, the tooth of the posterior claw of the hind tarsi, on its outer edge, nearly one-fifth the internal length of the remaining portion; corresponding ratio of the anterior claw one-third. Length 22.0 mm.

California (Los Angeles Co.).

The diagnoses here given are taken from the male; in the female of the present species the tarsal claws are rather smaller, the teeth more nearly equal, the greatest difference being in those of the anterior tarsi, the posterior being almost absolutely equal.

In Thyce the fourth palpal joint is received at base in a broad excavation in the apex of the robust transverse third joint, and the latter in turn is similarly connected with the second.

The proportional length of the fourth palpal joint in *pulverea* is the same as that given for *palpalis*, but the two species can be distinguished by the apparently denser pubescence of *pulverea*, by the more robust palpal joint in which the groove, according to the figure given by Dr. Horn, is differently shaped, and by the claws of the posterior tarsi, in which the teeth are said to be very nearly equal in *palpalis* (Trans. Am. Ent. Soc., VIII, p. 147).

T. fossiger n. sp.—Form rather broadly oval, convex, castaneous; head and prothorax piceous; vestiture throughout nearly as in *pulverea*, but slightly coarser, and with the erect hairs of the pronotum decidedly longer. *Head* small, wider than long; clypeus concave, truncate; angles narrowly rounded; sides parallel, strongly arcuate; antennal club slightly shorter than the stem and but very slightly longer than the fourth palpal joint, the latter elongate, rather slender, the apex distinctly deflexed, and with the usual minute circular truncation, one-third longer than the three preceding together; external groove entire, very narrow and deep, slightly enlarged near the base, and again much more feebly so near the apex. *Prothorax* two-thirds wider than long; sides laterally strongly angulate, the angle rounded; sides very feebly sinuate anteriorly, feebly arcuate toward base and nearly coarctate with the latter, the basal angles being very obtuse and broadly rounded; apical angles right, not rounded; apex very feebly emarginate, one-half as wide as the base, the latter broadly, feebly angulate, the angle broadly rounded; disk convex, even, finely, feebly and densely punctate. *Elytra* two-fifths longer than wide and two-fifths wider than the prothorax; sides feebly arcuate; apex broadly angularly emarginate; humeri very feebly tumid; disk with

very feeble traces of costæ, very minutely, feebly and densely punctate. *Pygidium* one-third wider than long, feebly convex, punctured, and very densely pubescent like the elytra. *Legs* moderate; tarsi as long as the tibiæ; claws nearly as in *pulverea*. Length 20.0 mm.

California (Los Angeles Co.).

This species is closely allied to the last, but differs in its shorter, more robust and flattened form, its shorter, more transverse prothorax with more angulate sides, which are more rapidly convergent toward base when viewed vertically, and in the structure of the antennæ and palpi. The pubescence of the elytra is more densely placed, and the pygidium more nearly vertical.

T. Harfordi n. sp.—Oval, convex, piceous-black throughout; vestiture yellowish-cinereous; silky hairs of under surface very long and dense; abdomen moderately densely covered with small robust recumbent hairs, each segment with a paler spot of denser pubescence at the side near the apex; maxillæ, hypomera, mesosternal parapleuræ, and metasternal epimera whiter and with short stout recumbent pubescence; vestiture of the elytra dense, the hairs robust, recumbent and rather long, sparser on the pronotum, the fine erect hairs of the latter long, dense and conspicuous. *Head* small, but very slightly wider than long; clypeus concave, broadly, feebly sinuate, the angles narrowly rounded and the sides parallel and feebly arcuate; antennal club robust, oval, much shorter than the stem and scarcely more than two-thirds as long as the fourth palpal joint: the latter greatly developed, more than one-half longer than the preceding joints together, elongate, and but moderately robust when viewed laterally, with the lower edge straight, the upper broadly arcuate, the apex scalpellate, the lower point of the apex not deflexed, and with an exceedingly minute circular truncation, having externally, an entire groove which is wide, elongate, elliptical, and extending fully one-half through the joint. *Prothorax* two-thirds wider than long; sides rather strongly angulate, the angle rounded; sides near it straight; basal angles obtuse and moderately rounded; apex very feebly emarginate, scarcely one-half as wide as the base, the latter broadly and rather strongly angulate, the angle broadly rounded; disk convex, very narrowly and feebly impressed along the median line, rather finely, feebly and densely punctate. Scutellum with a very fine subdenuded median line. *Elytra* two-fifths longer than wide and nearly two-fifths wider than the prothorax, with very feeble traces of broad costæ, together broadly, angularly emarginate at apex when viewed longitudinally; sides parallel and feebly arcuate; disk minutely, feebly and densely punctate. *Legs* moderate; tarsi about as long as the tibiæ. Length 19.0–20.0 mm.

California (Alameda Co.).

The claws are nearly as in the preceding species, but the teeth are slightly more slender and acute. The pygidium is but one-fourth wider than long. This species is very distinct in its strongly

developed palpi and correspondingly smaller, more robust and oval antennal club; it was taken very abundantly at night in the suburbs of Alameda, Cal., and is dedicated to an enthusiastic friend of entomological science—Mr. W. G. W. Harford, of Oakland, Cal.

DINACOMA n. gen. (Melolonthini).

Clypeus concave, parallel, subtruncate. Mentum moderate, subquadrate, concave. Maxillæ moderate, the palpi well developed; first joint very small, narrow, obconical; second and third longer than wide, the former the longer, both obconical and obliquely truncate; fourth slightly shorter than the preceding three together, pointed, deeply impressed or excavated on its outer face. Labial palpi very small; third joint ovoidal, obtusely acuminate, as long as the two preceding together. Labrum short, transverse, free, impressed in the middle. Antennæ ten-jointed; middle joints of stem subanchedylosed, short; club three-jointed, very long and arcuate in the males. Anterior coxæ transverse, but slightly prominent. Metasternal episterna moderate in width. Abdominal segments connate, the sutures fine but not entirely obliterated, rendered distinct by the disposition of the vestiture. Metasternum well developed. Legs rather short and slender; tarsi short, the posterior much shorter than the tibiæ; claws moderate, evenly and strongly arcuate, toothed near the base, the teeth distinctly unequal.

The above characters indicate a genus intermediate in many characters between Polyphylla and Thyce. It is founded upon *Thyce marginata* Casey (Bull. Cal. Acad. Sci., II, p. 39). The deep excavation of the fourth palpal joint, which is present in this genus in common with Thyce, is by no means confined to this group of genera, as it is a common character in Diplotaxis, although generally less developed.

The characters agreeing with Thyce, reside in the structure of the palpi and tarsal claws, and those which ally it most directly with Polyphylla, are found in the greatly developed male antennal club, and the short tarsi.

TENEBRIONIDÆ.

EDROTES Lec.

The four species of this genus may be separated as follows:—

Pubescence long and erect.

Pubescence more condensed in several narrow widely distant lines on each elytron; surface highly polished, very minutely and sparsely punctate,

the punctures more dense—but still confused—along the more densely pubescent lines, strongly convex.....**ventricosus**
 Pubescence denser, without trace of serial arrangement.

Lustre rather dull; form strongly convex; punctures dense, very large and deeply impressed; antennæ rather robust.....**rotundatus**

Polished, subdepressed above, more abruptly and strongly convex at the sides; punctures small, sparse and perforate; antennæ longer and very slender, less capitate.....**nitidus**

Pubescence very short, subrecumbent, not definitely arranged.....**globosus**

E. nitidus n. sp.—Broadly-oval, black; legs piceous; antennæ dark rufous. *Head* distinctly narrower than the prothorax; median lobe of epistoma strong, much wider than long, truncate, dilated at apex; outer face of mandibles very coarsely and densely punctate, the punctures distinctly separated. *Prothorax* fully four times as wide as its median length; apex broadly emarginate in circular arc, the apical angles strongly, anteriorly produced and acute; sides very feebly convergent from base to apex, extremely feebly sinuate toward apex; base truncate; lateral acute edge obsolete except at the apical angles; disk finely very sparsely punctate in the middle, the punctures becoming much larger, dense and subasperate laterally. *Elytra* widest just before the middle; sides strongly, evenly arcuate, the apex from above very broadly rounded; disk somewhat flattened above, nearly six times as long as the median pronotal length, and about one-third wider than the prothorax, finely, sparsely punctate, the punctures generally separated by from four to five times their own diameters. Length 7.5 mm.

California (Mojave Desert, Kern Co.).

This species is quite distinct from any of the others; the pubescence is long and somewhat coarse, evenly distributed over the elytra, a little shorter, sparser and coarser than in *rotundus*, and distinctly shorter, more matted and slightly coarser than in *ventricosus*; the latter is larger and much more minutely punctate.

E. globosus n. sp.—Very broadly oval and strongly convex, black throughout; legs and antennæ slightly piceous; pubescence very short, cinereous, abundant and depressed. *Head* moderate; median lobe of epistoma wider than long, feebly constricted at base, the angles rounded and apex truncate; punctures of outer face of mandibles coarse, deep and dense, polygonally crowded. *Prothorax* very strongly transverse, broadly, very feebly emarginate in circular arc at apex; lateral edges completely obsolete and broadly rounded, the apical angles alone acute and prominent; disk polished, very finely and sparsely punctate in the middle, abruptly coarsely, deeply and very densely so at the sides, the punctures mutually contiguous. *Elytra* subglobose, very strongly convex, rather coarsely, densely and evenly punctate throughout the disk, the punctures separated generally by rather more than their own diameters. Length 5.5 mm.

Colorado (Greeley).

A very interesting form, quite isolated by reason of its small size, convex subglobose elytra, and very short subrecumbent pubescence. It is one of the many interesting discoveries of Mr. H. F. Wickham.

USECHUS Mots.

Two species of this genus are now known; they may be distinguished as follows:—

Median impressed area of pronotum fusiform, entire, more or less coalescent with the basal fovea, the latter narrow and elongate; elytral punctures very large, widely separated in the rows; pubescence very sparse; color blackish-piceous**lacerta**

Median impressed area feeble, the subcariniform sides nearly straight and parallel, entirely obsolete just behind the middle; basal fovea larger, rounded, always deep, distinct and isolated; elytral punctures smaller, more closely placed; pubescence denser and rather longer, more densely and conspicuously nucleated in twelve small spots on the elytra; color paler, brown; size smaller.....**nucleatus**

The species above defined as *lacerta*, has been identified from the somewhat unsatisfactory figure given by Motschulsky.

U. nucleatus n. sp.—Of the same form as *lacerta*; pubescence pale flavate, rather sparse but denser and conspicuous on the elevated ridges, and in twelve spots on the posterior two-thirds of the elytra, disposed on each elytron as follows: one just before the centre, three in an oblique line at posterior third, and two in a line nearly parallel to the suture, rather indistinct, and very near the apex. *Head* small, rather coarsely and sparsely punctate. *Prothorax* as wide as long; posterior angles small, acute and prominent; base four-fifths as wide as the disk; surface finely tuberculate, each tubercle with a small lateral puncture bearing a stiff subrecumbent seta. Scutellum extremely minute, twice as long as wide, pointed, slightly tumid. *Elytra* with fine feeble costæ, the intervals deeply punctate, the humeral costa very strong toward base, the base also very strongly tumid at one-third the width from the suture to the sides, the posterior densely pubescent spots also slightly tumid. Length 3.0–4.2 mm.

California (Humboldt Co.).

Occurs in great abundance in the Hoopa Valley, and may be distinguished at once from *lacerta*, not only by the characters given in the table, but by the form of the smooth and impunctate furrow which extends along the lateral edges of the pronotum behind the antennal excavations. In the present species this furrow extends nearly in circular arc from the excavations, past the basal angles,

and terminates at the rounded median basal fovea, while in *lacerta* it is narrower and deeper, and terminates at the basal angles; this character is comparatively constant. In *lacerta* the densely pubescent spots referred to as a prominent character of *nucleatus*, are also visible and in nearly the same positions, but they are always feebler; the length of *lacerta* is 4.0–5.0 mm.

CÆLOTAXI Horn.

The form of the body in this genus somewhat resembles that of *Coniontis*, but is as a rule rather more broadly and evenly elliptical, the prothorax being more strongly narrowed from base to apex. The sculpture is stronger and denser, and the setæ, which are seldom prominent and nearly always recumbent in *Coniontis*, here become much denser and more erect, in this latter respect resembling those of the aberrant *Coniontis obesa* Lec. The species are entirely confined to the small island of Guadalupe, off the coast of Lower California.

Most of the material before me has been recently collected by Mr. G. W. Dunn; the series is very extensive, amounting to about forty specimens, and indicates three species which may be distinguished as follows:—

Form broadly elliptical; sides arcuate.

Punctuation of elytra sparse, not muricate; surface shining; setæ fine, easily removable **punctulata**

Punctuation of the elytra distinctly muricate; setæ coarse, very persistent, always present on the elytra **muricata**

Form narrow, oblong; sides parallel and nearly straight; surface dull, densely, coarsely muricate **angustula**

C. angustula n. sp.—Oblong, moderately robust; sides parallel and nearly straight; color above dark brownish-ferruginous, beneath slightly paler and more rufous; legs concolorous; lustre dull. *Head* slightly wider than long; median impression very small and nearly obsolete; punctures rather coarse, deep, very dense, sparser on the occiput; a small median area at the base impunctate. *Prothorax* transversely, strongly convex, fully twice as wide as the median length; sides feebly convergent from base to apex and feebly, evenly arcuate; apex broadly emarginate; base nearly straight, except at the sides where it becomes distinctly sinuate; basal angles distinctly produced posteriorly, right when viewed laterally, not rounded, apical very narrowly so; disk very narrowly reflexed at the sides, coarsely, very deeply and densely punctate, most densely so at one-fourth the width from the sides, where the punctures tend to coalesce longitudinally, more sparsely so near the edges. *Elytra* at base as wide as the prothorax; sides parallel and nearly

straight for two-thirds the length from the base, thence together rather acutely rounded behind; disk transversely, strongly convex, rather coarsely, densely and asperately punctate; interspaces dull; pubescence fine, rather long and dense. Length 7.5–9.0 mm.; width 3.8–4.7 mm.

Guadalupe Island.

The present species, which is represented by a series of eight specimens, is immediately distinguishable from the others by its narrow subcylindrical form, parallel and much more rectilineal sides, and generally coarser pronotal punctuation.

C. muricata Horn.—Represented by a good series showing slight variation, especially noticeable in the size and density of the pronotal punctuation. The color varies from dark brownish-ferruginous to piceous-black. One specimen differs in its more broadly oval form.

Length 8.0–10.5 mm.; width 4.3–5.5 mm.

C. punctulata Horn.—This species is represented by a homogeneous series of twelve specimens. The color varies from rather pale rufo-ferruginous to piceous-black.

Length 9.5–12.0 mm.; width 4.8–6.0 mm.

All the species of this genus have a narrow, more or less incomplete, median pronotal line which is impunctate.

CÆLUS Esch.

The genus *Cælus* is peculiar to the coast regions of California, and is found in abundance in the sand dunes which line the seashore. The species are somewhat closely allied, but scarcely to so great a degree as in *Cælotaxis* and *Coniontis*. They may be recognized by the characters given in the following table:—

Anterior angles of epistoma distinctly prominent; size large **grossus**
Anterior angles not at all produced, broadly rounded.

Form narrowly oval; pronotal punctuation very fine and sparse, unevenly distributed **ciliatus**

Form broadly oval; pronotal punctuation coarse and deep.

Punctures sparse **arenarius**

Punctures dense, evenly distributed, sometimes semicoalescent.

globosus

These species vary considerably in size, but the general outline and punctuation are quite constant, so that there can be no difficulty in identifying the forms here described.

C. grossus n. sp.—Form rather broadly oval, very convex; dark castaneous to piceous-black, shining, minutely and sparsely setose above, more densely

so near the sides, the latter ciliate with long erect setæ; under surface and legs but slightly paler. *Head* much broader than long, coarsely and densely punctate; sparsely punctate near the base, very convex, strongly declivous to the clypeal suture, which is well marked; clypeus feebly convex, very broadly and strongly sinuate anteriorly; labrum large, rufous in color; near the clypeal suture there are several coarse flavate setæ. *Prothorax* slightly more than twice as wide as long, transversely, strongly and evenly convex; sides feebly convergent from base to apex, distinctly and evenly arcuate; base transversely truncate; angles—viewed laterally—very slightly obtuse and scarcely at all rounded; apex strongly emarginate, fringed with flavate setæ; angles evenly and rather narrowly rounded; disk irregularly punctate; punctures rather sparse in the middle, coarser and slightly denser near the sides; base having a fine coriaceous or semimembranous margin. *Scutellum* minute. *Elytra* slightly longer than wide, slightly more than twice as long as the prothorax; sides parallel and feebly arcuate for three-fifths the length from the base, together thence evenly and somewhat parabolically rounded behind; disk very strongly convex, finely rugulose, rather coarsely and not densely punctate; punctures evenly distributed, slightly coarser and sparser than those of the pronotum, slightly asperate. *Legs* rather short and robust; tarsi slender, first joint of the anterior produced beneath the next three and the basal portions of the fifth. Length 8.8–12.5 mm.

California (Monterey; San Pedro).

The distinguishing features of this species are its large size and peculiarities of pronotal sculpture. In *ciliatus* the punctures of the pronotum are fine and nearly evenly distributed over the entire disk, while in *grossus* they are slightly coarser, and are almost entirely wanting in a broad band, crossing the disk at about one-third its length from the apex, but not attaining the lateral margins. This character is quite constant throughout a series of ten specimens which I have before me.

C. globosus Lec.—I obtained two specimens of this species at San Diego, California. It may be distinguished from *ciliatus* and *grossus* by the very coarse and much denser pronotal punctuation, and the broadly oval form, being even more dilated than *grossus*. From *arenarius* it differs in its much denser punctuation and slightly broader form.

C. arenarius n. sp.—Form rather broadly and evenly elliptical, convex, shining, piceous to piceo-castaneous. *Head* much broader than long; clypeus broadly and feebly sinuate at apex; lateral angles broadly rounded; suture deep, straight; surface rather coarsely, densely punctate. *Prothorax* widest slightly before the base, more than twice as wide as long; sides strongly convergent from base to apex, rather strongly arcuate; basal angles slightly rounded; apex broadly emarginate; disk convex, coarsely, sparsely and

somewhat unevenly punctate; punctures denser toward the lateral edges, where also they are intermingled with finer punctures. *Elytra* as wide as the prothorax, broadly rounded behind, but very slightly longer than wide, slightly more than twice as long as the prothorax; surface convex, coarsely, deeply, rather sparsely and asperately punctate; punctures slightly denser and more strongly granulose toward apex. *Legs* short. Length 6.5–8.5 mm.

California (San Pedro, Los Angeles Co. 2).

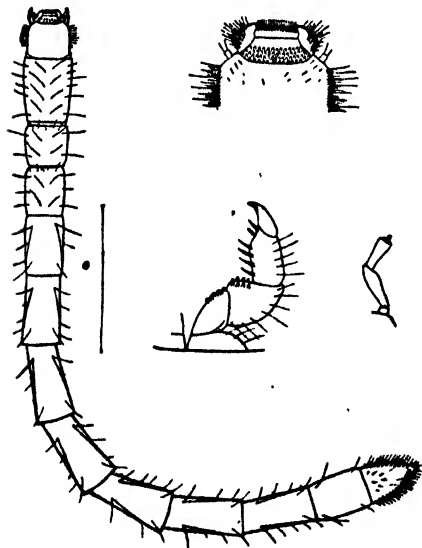
This species somewhat resembles the smaller forms of *grossus*, but may be known by the broadly rounded clypeal angles, these being narrowly rounded and distinctly produced anteriorly in that species.

C. ciliatus Esch.—This species is very abundant about San Francisco. The series of thirty specimens before me indicates but slight variability except in size, the specimens ranging from 4.8 to 8.0 mm. in length.

LARVA.

The following description will serve for the identification of the larva of *Caelus ciliatus*. The specimens upon which the descrip-

tion is based were found in a small sandy tract, in which the imago was more than usually plentiful, and undoubtedly represent the true larva.¹



Body very elongate, slender, cylindrical. Surface shining, having a few very long fine setae, herissate with stiff fulvous setae at the apex and sides of the head, and beneath the latter and the thoracic segments. Integuments coriaceous, pale luteo-testaceous; head, prothorax and anal segment subcorneous, darker, rufo-testaceous.

Head as wide as the prothorax, as long as wide. Post-epistomal region slightly wider than long; sides parallel, nearly straight;

¹ The figure on the left represents the entire body; that to the right and above, the anterior portion of the head, more highly magnified. Of the two

base transversely truncate; apex very broadly, feebly emarginate in the middle three-fifths, receiving the base of the epistoma; surface shining, with a few erect dorsal setæ, feebly and sparsely creased, having two oblique lines of coarse feeble punctures in front of the middle, and three in the middle near the epistomal margin; side margins bristling with erect setæ. Epistoma trapezoidal, transverse, feebly declivous; apex transversely truncate; apical two-fifths glabrous, shining, very feebly rugulose; basal three-fifths densely covered with small, robust, spiniform tubercles. Labrum strongly transverse, truncate at apex, having a loose fringe of short porrected setæ along the apex; surface broadly, very feebly convex, polished, glabrous, with a double line of small, erect, very robust spines near the apex. Mandibles not prominent, visible laterally; surface flat; outer margin broadly bilobed; anterior lobe with an elevated margin; posterior with a double line of coarse, erect spines near the lateral margin; outer face bristling with erect, coarse setæ. Antennæ short, rather slender, four-jointed; third joint obconical, shorter than the second; fourth small, subulate, enlarged and bulbous at base, the enlargement enclosed by the apex of the third joint. Maxillæ well developed; base very large and prominent. Maxillary palpi rather slender, not compressed, with three free joints, the basal being very short, broad, and anchylosed to the supports; first free joint slightly longer than wide, truncate at apex, slightly obconical; second fusiform, distinctly longer than wide, broadly truncate at base and apex; third small, oblique, sides nearly parallel, twice as long as wide, two-thirds as long as the second, apex truncate. Mentum longer than wide, rather small, transversely, strongly convex; surface setose, granulose, also coarsely asperate; gular peduncle trapezoidal, well marked. Ligula slender, projecting far beyond the mentum. Labial palpi small, apparently of two joints, terminal slender, oblique, much longer than wide. Eyes wanting.

Prothorax much longer than wide, slightly narrowed from apex to base; sides very feebly arcuate; apex and base broadly, transversely truncate; surface cylindrical, having a double row of four small setigerous punctures near the middle and extending from base to apex; lateral suture inferior; under surface behind the coxæ conical, ascending upward from the base, shining, glabrous anteriorly, setose toward base. Legs far before the middle, short, robust, compressed; coxæ approximate, short; basal joint triangular, with a few short robust tubercles near the apex interiorly; second larger, triangular, with a double row of small tuberculiform spines along the inner apex; third as long as the second, longer than wide, with a row of long, erect, very strong spines along the inner edge; terminal claw very large, acuminate at apex.

Mesothorax short, scarcely longer than wide, cylindrical, constricted at apex; surface with a few setigerous punctures anteriorly near the constriction, and a more widely distant row near the base. Legs at the middle of the segment, very small, rather robust. Surface before the coxæ carinate in the middle;

remaining the one on the left represents the anterior leg with its coxa, and that on the right the antenna.

that behind them convex at the sides, the convexities being separated by two divergent, impressed grooves.

Metathorax longer than wide, nearly cylindrical. Legs slightly behind the middle. Surface nearly as in the mesothorax.

Abdominal segments longer than wide, subcylindrical behind, more conical near the middle. Each segment having on the flanks a fine, impressed, very obliquely descending groove beginning before the middle; lines of juncture of the dorsal and ventral surfaces far inferior, straight, divergent from apex to base, strongly impressed.

Anal segment longer than wide, pointed, ogival, convex above, herissate with coarse, erect, fulvous setæ more sparse dorsally, with a few dorsal spines and a row of erect spines parallel to and very near the edge extending from base to apex. Lower surface with two large tumid processes covered with short erect spines, arranged transversely near the middle and just before the anal orifice; the latter closed by a small complicated fold which is not prominent; surface thence to the apex on a superior plane, smooth.

Length 18.0 mm.; diameter 1.1 mm.

CÆLOMORPHIA n. gen. (Coniontini).

Body oval, convex, sparsely and minutely setose above, ciliate at the sides. Head inserted in the prothorax to the middle of the eyes, short, broad; clypeus rounded at the sides, broadly sinuate anteriorly; mentum moderate, obtrapezoidal; maxillæ broadly exposed at the sides; maxillary palpi well developed, third joint small, obconical, one-half as long as the second, fourth as long as the preceding two together, elongate, moderately dilated, cylindro-ovoidal, obliquely truncate within at apex; labial palpi small, third joint feebly dilated, cylindro-ovoidal, acuminate at apex; antennæ very short, incrassate, 10-jointed, first joint short, inserted in front of the coarsely granulated eyes and under the overhanging sides of the clypeus. Legs rather slender, spinulose; posterior tarsi slender, basal joint elongate; anterior tarsi scarcely as long as the tibiæ, first joint large, produced beneath the second and third joints; tibiæ not sensibly produced exteriorly at apex, terminating in two short spurs and several small spinules. Epipleuræ broad, rapidly diminishing in width toward the elytral apices which they attain. Scutellum minute, triangular.

This genus is well distinguished from *Cœlus* by its 10-jointed antennæ and broad epipleuræ, also by the form of the prothorax.

The labrum is strongly retractile, and in three of the four specimens examined is completely invisible, the mandibles being fully exposed from above; the organ is indeed so fully retracted that merely the apex can be seen, even by looking far under the clypeus, which is separated from the mandibles by considerable intervening space. The fourth specimen is paler in color, and has the labrum protruded, showing this to be rather large and as usual broadly

sinuate at tip. The labrum is freely retractile in a great many other genera of Tenebrionidæ.

The genus *Cœlus* is a highly specialized form of the group Coniontini, which embraces two distinct types, distinguished primarily by antennal and tarsal structure, and represented by *Cœlus* and Coniontis. The genus *Cœlotaxis* is the connecting bond between the two sections, since it possesses the long slender antennæ of Coniontis, and, in a rudimentary degree, the tarsal structure of *Cœlus*. *Eusattus* is closely related to Coniontis. *Cœlomorpha*, on the other hand, while exhibiting a decided relationship with *Cœlus*, is a still more highly specialized and extreme form, and perhaps may be considered a transition toward a group or genus now extinct or not as yet discovered. This view is principally based upon the broad epipleuræ and the form of the basal portions of the prothorax.

The prolongation of the basal joint of the anterior tarsus, which is most highly developed in *Cœlus* and *Cœlomorpha*, is very moderate in *Cœlotaxis* and nearly obsolete in Coniontis, although in the latter a distinct tendency to prolongation may be perceived, the joint being very obliquely truncate at apex. In *Eusattus* the basal joint is much longer and more slender, and nearly every vestige of the prolongation is lost. If, therefore, the group be arranged systematically in accordance with this character, the genera would stand in the following sequence: *Cœlomorpha*, *Cœlus*, *Cœlotaxis*, Coniontis, and *Eusattus*.

As a general rule in this group the basal angles of the prothorax are prominent and produced posteriorly, and, although in *Cœlus* and a few species of Coniontis this character is nearly obsolete and the base of the prothorax almost straight and transverse, we can even in these cases clearly perceive the tendency to posterior prolongation. In *Cœlomorpha*, however, this character is completely reversed, for the base of the prothorax becomes evenly and posteriorly arcuate throughout its width, the basal angles being broadly rounded and gradually coarctate with the sides.

C. maritima n. sp.—Rather broadly oval, convex, shining, piceous to pale ferruginous; under surface and legs slightly paler. Head scabrous, hirsate with coarse erect setæ; antennæ very short, gradually and strongly incrassate, slightly compressed, scarcely two-thirds as long as the head; eyes very coarsely granulate. Prothorax distinctly more than twice as wide as long, broadly convex, margined along the base, which is broadly and evenly arcuate,

with a thin membranous border, broadly emarginate at apex; sides feebly convergent from base to apex, distinctly and evenly arcuate; basal angles broadly rounded, apical much more narrowly so; disk with a few widely and irregularly scattered punctures in the middle, which are coarse and excessively feebly impressed; near the sides the punctures are much more dense, stronger and distinctly scabrous or subasperate. *Elytra* connate, very convex; sides parallel and distinctly arcuate for three-fourths the length from the base; together broadly rounded behind when viewed vertically, acute with the sides straight when viewed longitudinally; disk excessively minutely subgranulose, finely rugulose, with fine, not dense, scabrous or subasperate punctures. Under surface moderately shining, finely, not densely and subasperately punctate. Epipleuræ nearly flat, finely subrugulose and asperate. Length 2.9–4.0 mm.

Lower California.

The species above described is the smallest member of the group. Several specimens were secured by Mr. G. W. Dunn, who informs me that its habits are entirely similar to those of *Cœlus*.

ULOPORUS n. gen. (Tenebrionidæ).

Head short, broad, subdeflexed. Clypeus broadly rounded, not obliquely elevated at the sides. Eyes convex, moderate, coarsely faceted, extending slightly further beneath than above, neither divided nor emarginate. Antennæ inserted under the acute lateral edges of the clypeus, almost adjoining the eye, moderate in length, very slender, the last three joints abruptly larger forming a distinct oblong club; first and second joints elongate-oval, slightly more robust, the first slightly the longer and wider; third very slender, three times as long as wide, rather distinctly longer than the fourth; eighth obconical, fully as long as wide; ninth abruptly much wider, subtriangular, wider than long; tenth obtapezoidal, twice as wide as long; eleventh as wide as the tenth, oval, slightly wider than long. Labrum very short, strongly transverse, truncate, the membranous band separating it from the clypeus fully as long as its exposed portion. Maxillæ large, greatly exposed and prominent; palpi well developed; second joint long and slightly clavate; third short; fourth very large, strongly securiform. Ligula short, indistinct; palpi rather small, not very robust; third joint rather longer than the second, feebly conical, twice as long as wide. Mentum small, slightly elongate, distinctly narrowed from apex to base and supported on a moderate peduncle. Prothorax short, wider from apex to base, the sides coarctate with those of the elytra, the sides of the pronotum margined with an elevated bead, the apex and base not margined, the latter fitted closely to the elytra. Prosternum short in front of the coxæ, rather widely separating the latter, the process very largely developed behind the coxæ, the apex angulate and received in a deep impression of the mesosternum; development behind the coxæ—near their inner margins—as great as before them in the same longitudinal line.

Mesosternum very short; coxæ widely separated, having a distinct trochantin. Metasternum moderate, the episterna moderate in width; posterior coxæ almost contiguous, just visibly separated. Legs short; femora moderately robust; tibiæ short, having two sets of terminal spurs, one at the inner and one at the outer edge; spurs short and rather slender; tarsi moderate in length, densely pilose beneath; first joint elongate, penultimate very small, the basal joint of the posterior about as long as the entire remainder, the second obliquely and distinctly lobed beneath. Scutellum rather small, strongly transverse, strongly rounded behind. Epipleuræ moderate in width, entire, horizontal behind, slightly broader and feebly inflexed toward base. Body evenly elliptical, moderately and evenly convex.

The posterior margins of the second and third ventral segments being finely coriaceous, determines the position of this rather puzzling genus to be in the Tenebrioninæ, and the eyes being more prominent than the sides of the front, together with other characters above given, seems to indicate that it should be associated with the Diaperini, where for the present it may be placed near *Platydemia*.

U. ovalis n. sp.—Evenly elliptical, moderately convex, somewhat strongly shining, rather densely pubescent, the pubescence very fine and extremely short; piceous, legs and antennæ dark brownish-rufous. *Head* retractile, very feebly, evenly convex, not in the least tuberculate, very finely and densely punctate. *Prothorax* nearly twice as wide as long; apex about two-thirds as wide as the base, the latter transverse with a broad very feebly arcuate median lobe; basal angles—viewed laterally—nearly right, not rounded, apical rather broadly rounded, not at all prominent; disk finely, very deeply and densely punctate. *Elytra* rather more than twice as long as the prothorax; sides arcuate; apex broadly rounded; surface very finely, densely punctate, with vaguely defined series of slightly larger, widely distant punctures, the series without the slightest trace of impressed striæ. Length 1.7 mm.

Texas (Columbus).

This species is widely diffused throughout the States bordering the Gulf of Mexico. I owe the specimen serving as the type of the above diagnosis, to the kindness of Mr. E. A. Schwarz, who discovered it in considerable abundance in the locality indicated.

APPENDIX.

CONTRIBUTIONS TO THE AMERICAN TERMITOPHILOUS FAUNA.

The species recently described in these Annals under the name *Termitogaster insolens*, was the beginning of a series of discoveries by Mr. J. Beaumont, in connection with certain studies in the life habits of Termes and its allied genera.

The specimens of the species named above, were found incidentally by Mr. Beaumont in the galleries of termites, and were transmitted by him, together with the neuropterous specimens serving in part as the basis of a recent paper by Mr. P. H. Dudley, which has just been published in the Transactions of this Academy. When the attention of Mr. Beaumont was called to the importance of his discovery, a more careful and systematic search was instituted, resulting in the capture of several very small specimens which have been placed in my hands for study by Mr. Dudley. These, as will be seen below, are found to represent two entirely new and very interesting genera, and, in addition, a new species of *Termitogaster*.

The coleoptera associated with the termites appear to be more specialized and more intimately connected with the life habits of their hosts than is the case with the more numerous myrmecophilous species, and their taxonomy is more difficult to a corresponding degree.

If any generalization can be made upon the little already known of these curious genera, it would appear that, having become so profoundly modified from the more usual types,—as seen for instance in *Spirachtha*, which is one of the most remarkable instances of adaptive development at present known,—it may be legitimate to suppose that the neuropterous termites are an older type geologically than the hymenopterous ants, whose coleopterous guests are generally less radically modified. This is of course under the supposition that the rapidity of evolution or adaptation has been approximately constant in the two cases, and that the coleoptera are either intermediate in age between the termites and the ants, or that they are the most ancient of the three. The truth is, probably,

that the more highly specialized forms such as *Spirachtha*, *Corotoca* and *Termitogaster*, are very nearly contemporaneous in origin with the termites, while the less specialized forms such as *Philoterme*s and the genera here described, are intermediate in age between the termites and true ants, since the latter genera are scarcely more modified than the majority of myrmecophilous forms.

TERMITOGASTER Casey.

In elytral structure the following species is an anomaly, and has scarcely a parallel in the entire order.

T. fissipennis n. sp.—Anterior parts slender, compactly joined, parallel and subcylindrical; abdomen strongly inflated; color pale brownish-flavate throughout, the exposed membranous portions white, the elytra slightly piceous; integuments slightly alutaceous, very sparsely setose.

Head scarcely as long as wide, not deflexed; sides short and parallel; basal angles narrowly rounded; base subtruncate, broadly arcuate, fitted into the apex of the prothorax almost throughout its width, the neck very wide; upper surface covered rather sparsely with minute subasperate points, very feebly convex, broadly, feebly impressed in the middle. *Eyes* rather large, almost evenly oval, very slightly longer than wide, convex and distinctly prominent, finely faceted, longer and slightly more prominent than the tempora. *Antennae* about two-fifths as long as the body, rather slender, cylindrical, loosely articulated, strongly geniculate; basal joint subequal to the next three combined; two to four decreasing rapidly in length, the latter just visibly longer than wide, obtrapezoidal, the sides but very feebly oblique; four to ten almost exactly similar, the ninth as long as wide, the tenth just visibly transverse; eleventh cylindro-ovoidal, pointed, as long as the two preceding; all the joints sparsely setose and also finely pubescent, more densely so toward apex and almost glabrous toward base; basal joint inserted in a small rounded entirely dorsal fovea, adjacent to the antero-superior margin of the eye. *Front* before the antennae advanced and strongly arcuate at apex, the surface just before the apical margin elevated in two broad approximate cariniform tubercles, immediately in advance of which the surface is very short and strongly declivous, the apical margin with a very minute deep rounded emargination, having the sides in the form of fine carinae and with the apical projections extremely fine and acute, but not greatly advanced. *Labrum* distinct, transverse, broadly, strongly sinuate at apex, with the surface strongly impressed opposite the sinuation, separated from the front by a membranous sheath. *Mentum* large, longer than wide, broadly impressed: apex very slightly narrower than the base; sides parallel. *Ligula* very short, membranous, sinuate at apex—viewed dorsally—with a short cylindrical porrect process projecting from the bottom of the sinuation, the paraglossae apparently entirely obsolete. *Labial palpi* very small, slender, the three joints decreasing uniformly and rapidly in width,

cylindrical, the last two subequal in length and together but slightly longer than the first. *Maxillæ* large, greatly exposed and prominent, especially toward base, the basal plate not in the least spinose; outer lobe¹ well developed, lunate, corneous, with the apex acute, the inner edge fringed with moderate setæ; inner lobe not made out. *Maxillary palpi* very large, conspicuous, sparsely setose and irregular; basal joint small, rather longer than wide, distinct; second extremely asymmetric, slightly transverse, feebly convex on the outer side, deeply excavated on the inner; third longer than wide, longer than the second, ovoidal, gradually pointed, convex on the outer side, broadly excavated on the inner, the fourth joint minute and spiniform, not oblique. *Mandibles* moderate, not made out, closed in the type.

Prothorax slightly wider than the head and a little wider than long; sides nearly straight and parallel; apex broadly strongly arcuate and rounded into the sides, the apical angles obsolete; base truncate throughout the width and very feebly arcuate, the basal angles nearly right and very narrowly rounded. *Pronotum* extremely feebly, evenly convex, not impressed, shining, excessively minutely, sparsely, subasperately punctate, each point bearing an excessively minute erect pale setiform hair; disk with two very widely distant subbasal setæ, and four, forming a trapezoid, in the apical half; viewed laterally the flanks are narrow and perpendicular, scabrous, the lower edge sinuate just behind the deflexed apical angles, which are acute and continued in front of the coxæ by the extremely short and almost lamellate ante-coxal prosternal piece. *Prosternum* extremely short, not one-third as long as the pronotum. *Anterior coxæ* very long, loosely attached in the large membranous cavities, finely scabrous, almost glabrous; femora long, the upper edge strongly arcuate, the tibiæ as long as the femora, coarsely, rather densely setose within, with two external rows of long slender widely-spaced setiform spines. The disk of the pronotum in the male is very slightly wider, and more distinctly longer, than the head; in the female the head is quite noticeably smaller, with the tempora not quite so prominent.

Mesothorax moderate in length. *Scutellum* rather large, transverse, ogival, in large part covered by the pronotum. *Parapleuræ* of the mesosternum finely scabrous, large and well developed. *Coxæ* very large, long, oblique, contiguous; trochanters moderate, with a short obtuse dentiform process within, the femora rapidly narrowed near the point of attachment on the trochanters, the tibiæ similar to the anterior but less densely setose within.

Metasternum well developed. *Elytra* equal in length and basal width to the corresponding dimensions of the pronotum; sides straight and parallel, each elytron distinct, the two separated by an interval, which at the apex is equal

¹ In *insolens* the outer lobe is shorter, wide, arcuate, the apex truncate internally and bearing a row of short stiff spinules; the inner lobe is very short, adjacent to the outer, the base obliquely corneous, the remainder semimembranous, the apex with a row of short spinules almost continuous with those of the outer lobe. The disposition of the lobes is somewhat similar therefore to that of *Homalota* and *Euryusa*.

to their own width, the sides of the interval straight and feebly convergent anteriorly, abruptly terminating at a point just behind the scutellum, where it is about one-half as wide as at the apex; surface coarsely and strongly reticulate, scabrous on the vertical flanks, sparsely clothed with exceedingly short erect setæ, and each with two long setæ near the inner margin, one near the base and another behind the middle; flanks perfectly devoid of true epipleuræ. *Episterna* large, triangular, very wide behind, but covered by the elytra before attaining the humeri. *Coxæ* with the inner portions large, porrect, contiguous, longer than wide, truncate at apex, with the surface broadly convex; trochanters large, simple; femora irregular, the upper edge broadly angulate just beyond the middle, the edge thence broadly incurvate in circular segment to the point of attachment; tibiæ sparsely setose within, the spinose setæ of the two external rows stronger. *Hind wings* wanting.

Abdomen with six segments, widely inflated, in the female three times as wide as the elytra, with the sides strongly arcuate, in the male very slightly narrower, with the sides slightly straighter in the middle; integuments in great part chitinous, the white membranous portions but slightly exposed; upper surface feebly convex, each segment above and beneath with two transverse rows of setæ; lateral border deep and strongly reflexed; lower surface very convex, the setæ longer.

Legs rather long and slender. *Tibiæ* parallel, truncate, without terminal spurs. *Tarsi* 5-jointed, rather long, slightly compressed; first joint as long as the entire remainder—slightly shorter in the anterior;—fourth anchylosed to the fifth.

Length 2.8 mm.

Colombia (Panama).

The above description is rather comprehensive, and includes generic as well as specific characters in order that the numerous differential characters distinguishing it from *insolens* may be made more evident. The differences reside mainly in the structure of the elytra, front, convexity and prominences of the eyes, and irregularities of the trochanters and femora; in *insolens* the elytra are absolutely connate, and soldered so completely together that the suture is only indicated by a very feebly impressed line,—as great a divergence from the corresponding structure in *fissipennis* as could well be imagined. In both, the maxillary palpi are exceedingly irregular, but in the present species they differ greatly from those of *insolens*. The fact that the tarsi, antennæ and general habitus are similar or parallel to those of *insolens*, seems to indicate that they should not be generically separated, but the great and radical differences show at the same time that the genus is probably one of great age in a geological sense.

In the male, the sixth abdominal segment is evenly emarginate

throughout its width in broad circular arc, while in the female the same segment is angularly produced in the middle for a short distance. The remarkable modification of the palpi and legs is not a sexual peculiarity, being developed to precisely the same extent in the male and female. The same remark applies also to *T. insolens*; in this species the sixth segment is truncate in the male, and feebly, roundly lobed in the middle in the female. In *insolens* the two mandibles are similar; they are rather slender, feebly arcuate, having internally just behind the middle a large oblique squarely truncate tooth; the portion beyond this is very slender and has, just before the apex, a small oblique tooth.

ABROTELES n. gen. (Aleocharini).

Body rather robust, subparallel; abdomen slightly inflated.

Head nearly twice as wide as long, porrect, feebly convex; sides very short, parallel, feebly arcuate; base inserted slightly within the prothorax, not in the least constricted; basal angles not exposed; apex broadly arcuate between the eyes, the latter rather large, finely faceted, not at all prominent, rounded, slightly angulate above. *Antennae* inserted in small foveæ on the vertical sides of the front adjacent to the middle of the anterior margin of the eyes, and just above the base of the mandibles, 11-jointed, very robust; first joint obconical, longer than wide; joints two to eleven forming an elongate cylindrical club, strongly tapering near the base and more feebly so near the apex, joined by a narrow point of support to the truncate apex of the basal joint at a point near its lower margin, the joints separated by transverse sutures, apparently mobile but each inserted far within the next preceding, subequal in length, about one-third wider than long, except the second which is obconical and but slightly wider than long, the third which is shortest and about twice as wide as long, and the eleventh which is pointed, slightly compressed and as long as the two preceding. *Epistoma* membranous, short, broadly trapezoidal, the apex broadly sinuate, not separated from the front by a suture, the chitinous portion of the front abruptly terminating at a broadly incurvate line between the bases of the antennæ. *Labrum* well developed, prominent, twice as wide as long; sides and apical angles continuously rounded; apex with a small very deep median sinuation. *Mandibles* very short and stout, arcuate, slender toward the acute apex, apparently with a large obtuse internal tooth at the middle. *Mentum* large, slightly longer than wide; base and sides continuously rounded; sides slightly convergent in apical third and nearly straight; apex truncate; surface flat, corneous in basal two-thirds, transparently membranous in apical third, the line of demarcation sinuate and without visible suture; chitinous portion with two long erect setæ near the centre, arranged transversely and nearly trisectioning the width. *Ligula* moderate, membranous, with a short rounded simple median process, the paraglossæ small,

rounded and advanced as far as the apex of the median lobe. *Labial palpi* 3-jointed; basal joint slightly longer than wide, cylindrical; second much shorter, very small, cylindrical; third longer, subulate. *Maxillæ* moderate, not exerted; lobes small, the outer enveloping the inner, not hooked at apex, ciliate. *Maxillary palpi* nearly of the usual type, rather slender; second and third joints subequal; fourth subulate. Under surface of head without trace of lateral carinæ.

Prothorax rather short. *Pronotum* transverse; apex truncate; base just visibly arcuate; sides feebly arcuate and just perceptibly convergent from base to apex; basal angles nearly right and extremely narrowly rounded; flanks rather shallow, very strongly deflexed, the lower edge straight, the apical angles—viewed laterally—more broadly rounded than the basal. *Hypomera* very strongly inflexed, almost parallel to the pronotal flanks. *Prosternum* extremely short before the coxæ, the latter large.

Mesothorax short. *Scutellum* triangular, strongly transverse, the apex exposed. *Mesonotal parapleuræ* small, the epimera but partially developed, leaving a considerable extent of membrane exposed adjacent to the elytral humeri. *Coxæ* moderate and not greatly exerted, the cavities confluent.

Metathorax longer. *Elytra* transverse, truncate at apex, as wide as, and with the suture subequal in length to, the pronotum, not connate; suture not beaded; hind wings apparently not well developed; apical edge slightly inflexed and membranous; flanks without true epipleuræ, not beaded. *Metasternal episterna* very wide behind, their inner line tangent to the elytral humeri. *Coxæ* rather narrow, extending to the very wide episterna, contiguous.

Abdomen slightly wider than the elytra, the sides feebly arcuate, consisting of six segments. Upper surface flat, each segment with a single apical series of long stiff setæ; border wide, but not inclined. Lower surface convex, the setæ shorter and not definitely arranged.

Legs short and robust. *Femora* oblong, deeply excavated along the lower edge toward apex for the reception of the tibiæ, the latter nearly equal in length to the femora, parallel, truncate or slightly rounded at apex, more finely pubescent, entirely devoid of terminal spurs or spinules, but having several very long stiff setæ along the external edge. *Tarsi* short, rather robust, pubescent, 4-jointed on all the legs, the first joint of the posterior as long as the next two together and equal in length to the fifth. *Ungues* very small, arcuate. Anterior tarsi with a better defined tuft of long hair beneath each joint.

There is no described genus known to me with which the present can be compared. The robust compact cylindrical antennæ are characteristic of a number of termitophilous and myrmecophilous genera, but none of these appears to have the posterior tarsi four-jointed, as they very clearly are in *Abroteles*.

A. Beaumonti n. sp.—Pale piceo-testaceous; abdomen flavate; integuments polished, not perceptibly punctate. *Head* very finely, sparsely pubes-

cent; antennæ slightly shorter than the head, pronotum and elytra combined. *Pronotum* very slightly less than twice as wide as long, very feebly, transversely convex, not distinctly impressed, with a series of wide-spaced erect setæ along the apical margin and thence along the sides to the middle, where they abruptly terminate; disk extremely sparsely pubescent, the hairs subrecumbent, very minute toward the middle, longer and stiffer toward the sides, and posteriorly to basal fifth, where they abruptly terminate in a transverse line parallel to the base; surface thence to the base glabrous, except a few minute hairs along the fine paler semi-coriaceous posterior edge, extending anteriorly along the sides to about the middle. *Elytra* polished, depressed; sides straight, feebly divergent from base to apex, almost exactly similar in form to the pronotum, and almost imperceptibly longer, at base slightly narrower, very sparsely clothed with rather stiff subrecumbent hairs, evenly but not regularly disposed. *Abdomen* distinctly longer than the anterior parts combined, and distinctly wider than the elytra; sides arcuate; upper surface almost glabrous, except the wide depressed border which is very finely and indistinctly pubescent; under surface almost completely glabrous in the middle, but very finely pubescent laterally. Length 1.8 mm.

Colombia (Panama).

In the male, which appears to be much more abundant than the female, the sixth segment is very broadly rounded behind, the middle of the apical margin truncate or excessively feebly incurvate; in the female this segment is broadly and feebly produced in the middle in a wide broadly rounded lobe. The elytra also appear to be very slightly shorter in the female.

In dedicating this species to Mr. J. Beaumont, I wish to acknowledge a strong appreciation of the patience and scientific zeal on his part, which have led in so short a time to a decided advance in our knowledge of the interesting and apparently greatly diversified termitophilous fauna of Tropical America.

PERINTHUS n. gen. (Aleocharini).

Body nearly as in *Myllæna*, densely and very minutely pubescent.

Head small, strongly deflexed, deeply inserted in a rounded apical emargination of the prothorax; portion behind the antennæ much wider than long, not in the least constricted at base, the latter covered by the pronotum; surface evenly, moderately convex. *Eyes* large, finely faceted, minutely, rather densely setose, not prominent, rounded, occupying nearly the entire sides of the head and, in repose, partially overlapped by the pronotum. *Antennæ* inserted in small foveæ adjacent to the anterior margin of the eye on the abruptly inclined and concave apical portion of the front—epistoma—which is corneous and separated from the front proper by a transverse finely cariniform line, which is sinuate behind each fovea, and anteriorly arcuate and more

advanced in the middle, abruptly terminating at each side at the antero-superior margin of the eye; they are 11-jointed, moderate in length, very strongly flattened; when viewed on the compressed side the sides are parallel as far as the fourth joint, thence narrowed to the base of the third; first joint rather slender, longer than wide; second slightly narrower, much shorter, subcylindrical, longer than wide; third obconical, slightly longer than wide, compressed; fourth about as long as wide, obtusely triangular; remaining joints subequal, truncate at base and apex, with the sides almost parallel, in close contact throughout the width, rather more than one-half wider than long on the compressed side, and very slender, fully one-half longer than wide on the edge, the eleventh joint slightly shorter than the two preceding. Apical margin of the epistoma membranous, truncate, the *labrum* large, prominent, wider than long, with the apical angles broadly rounded, the apex with a small feeble median sinuation. *Mandibles* small, arcuate, acute and simple at the immediate apex. *Mentum* large, equilatero-triangular, with the sides straight; surface flat; apex very narrowly truncate; basal half corneous, apical membranous, the dividing line feebly sinuate, not at all impressed. *Ligula* moderate, wider than the apex of the mentum, rather long, with a prominent deeply bifid median process, the *paraglossæ* not well developed. *Labial palpi* robust at base, the joints rapidly decreasing in thickness; third subulate. *Maxillæ* moderate, feebly exerted; lobes small, ciliate. *Maxillary palpi* of the usual type, rather slender; second joint shorter than the third; fourth subulate. Lower surface without trace of infra-ocular ridge, the eyes approaching within a very short distance of the buccal cavity.

Prothorax strongly developed dorsally, very feebly so ventrally. *Pronotum* large, strongly, transversely convex, moderately narrowed from base to apex; basal angles evenly, somewhat obtusely rounded and slightly produced posteriorly, the base being incurvate and subtruncate between them. *Hypomera* very wide, extremely strongly inflexed, parallel to the strongly inclined flanks of the pronotum. *Prosternum* very small, extremely short in front of the *coxæ*, the latter large, conical and convex.

Mesothorax short. *Scutellum* invisible, completely concealed by the greatly overlapping free edge of the pronotum. *Mesosternal side-pieces* ample, entire; *coxæ* large, contiguous.

Metathorax moderate. *Elytra* truncate, apparently connate, very short and transverse, as wide as the prothorax, but slightly more than one-half as long, transversely convex; flanks strongly inclined, the epipleuræ very strongly inflexed and almost parallel to the flanks, deep; suture very fine but distinct. *Metasternum* wide; episterna narrow, parallel; *coxæ* moderate, contiguous, lamellate and transverse laterally.

Abdomen at base slightly narrower than the elytra, conical; sides rapidly convergent to the acute apex and nearly straight, consisting of six segments which are moderate in length, each having a single transverse series of long widely-spaced apical setæ above and beneath. Upper surface moderately convex, the border narrow, normal, moderately deep. Lower surface more strongly convex.

Legs short. *Femora* stout, the flanks produced beneath slightly at apex, forming a channel for the partial reception of the tibiae. *Tibiae* slender, short, cylindrical, truncate, without terminal spurs or spinules and devoid of long external setae. *Tarsi* short, slender, cylindrical, densely pubescent, about two-thirds as long as the tibiae, 4-jointed on all the legs; first joint of the posterior distinctly longer than the next two together and a little longer than the fourth. *Ungues* small and slender.

This genus is also somewhat isolated, harmonizing but remotely with any of the more usual forms of the great and composite group to which it is assigned. The extraordinary compressed, almost tape-like antennae, deep flanks of the pronotum and elytra, which extend far below the plane of the lower surface, very short elytra, long conspicuous tactile setae, and four-jointed tarsi, form a combination of characters for which it is difficult to find a fitting place in the series.

The sexual characters, also, are very singular. In the male the apex of the abdomen is not modified beneath, the sixth segment being evenly rounded behind, but dorsally, the posterior edge of the first segment is strongly emarginate in middle fourth, the bottom of the emargination being transverse. In the female the sixth segment is rounded as in the male, but the basal segment is entire.

P. Dudleyanus n. sp.—Piceous; abdomen slightly paler; under surface, legs and antennae pale brownish-flavate; surface lustre alutaceous, the pubescence exceedingly short, fine, dense, slightly cinereous and conspicuous, the long tactile setae very conspicuous, these consisting of six longitudinal series on the pronotum—counting those of the lateral edges—and a transverse series just before the middle of the elytra, the latter being simply the terminal setae of the pronotal series, the setae of the abdomen being a further continuation of the pronotal series. *Head* small, only the occiput visible from above, the anterior portions of the body appearing to be semicircularly rounded, much less than one-half as wide as the base of the prothorax; antennae about as long as the head and prothorax together. *Prothorax* nearly one-half wider than long, narrowed from base to apex, subconical; sides very feebly arcuate. *Elytra* about equal in width to the prothorax, strongly transverse; sides parallel and nearly straight; disk scarcely perceptibly more than one-half as long as the pronotum. *Abdomen* distinctly longer than the anterior parts combined, conical, acute. Length 1.4–1.7 mm.

Colombia (Panama).

Taken in considerable abundance by Mr. Beaumont. A good series has been given me by my friend Mr. P. H. Dudley, to whom it gives me great pleasure to dedicate this very interesting species.

In glancing through the plates of Schiödte's splendid work on coleopterous larvæ, we cannot resist drawing a few minor generalizations with reference to the great persistency of larval type which prevails throughout some families, as for instance the Scarabæidæ and Tenebrionidæ, and the enormous diversity of type exhibited by others, notably the Staphylinidæ, there being scarcely a corresponding diversity of imaginal type in the latter, although the imago is undoubtedly more heterogeneous than in either of the families before mentioned. Incidentally we may perhaps be warranted in inferring that the Scarabæidæ and Tenebrionidæ, being more homogeneous and less differentiated in both larval and perfect stage, are more recent in origin than the strongly differentiated Staphylinidæ; this is of course under the general premise that multiplication of species is due to differentiation from fewer and more synthetic ancestral forms, although I am aware that Dr. Sharp holds that there is but slight evidence of such divergence in the Dytiscidæ. The truth is, probably, that the Staphylinidæ constitute one of the most ancient types of coleoptera.

Regarding the curious object described below, it can only be said that if it be staphylinidæ, as there is some reason to suppose, it will add another notable element to the heterogeneity characterizing that interesting family. Or, conversely, its wide departure from the usual types of coleopterous larvæ will not, of itself, be an obstacle in the way of its assignment thereto. In this connection it is desirable to make the following observations:—

1. The specimens were received in two small tubes which, in one instance, contained besides only specimens of *Termitogaster insolens*, and in another, only *Perinthus Dudleyanus*. Mr. Beaumont seems to have been careful to isolate his material, and it may be very safely assumed that the larvæ and beetles were taken together from the same nest.

2. As far as its general nature is concerned, I believe it to be coleopterous, although in antennal structure it is exceedingly exceptional for that order, being approached in this respect, within my knowledge, only by Cyphon. The dense squamose vestiture, enormous development of the labial palpi and tarsal structure are also exceedingly peculiar.

3. Assuming it to be coleopterous, I am quite convinced that it cannot be related in any way to *Termitogaster*, but think that it may possibly be the larva of *Perinthus*, the long tactile setæ of the

upper surface, as well as the conical and attenuate form of the abdomen, reminding us forcibly of *P. Dudleyanus*.

Whatever future investigation may prove it to be, the following short description will serve to make known its most salient characters:—

Body fusiform, obtusely rounded in front, attenuate and acute behind—nearly as in *Lepisma*, but with the abdomen more strongly and evenly conical,—convex, and covered densely above and beneath with large pearly-white closely recumbent strigose scales; integuments soft, membranous and pure white throughout. The head is deflexed, densely squamose, devoid of eyes and ocelli, having the antennæ inserted on the front, approximate and separated by a narrow very feeble ridge, very perceptibly attenuate from base to apex, rather more than one-fourth as long as the body, cylindrical, 12-jointed, the subbasal joints short, closely approximate or subconnate, the outer more elongate and more loosely articulated, the joints annulated with fine impressed grooves, one to three in number. The maxillary palpi are moderate in length, cylindrical, 4-jointed, the last joint longest. The labial palpi are large and strongly developed, with the last joint very large, ovate, pointed at apex, concave without and convex within. The three segments of the thorax are distinct, the flanks thin and descending very noticeably below the plane of the lower surface, the pronotum as long as the mesonotum and metanotum combined, each of the dorsal segments, including those of the thorax, bearing a transverse apical series of long widely spaced tactile setæ. The six legs are short, the coxæ large, conical, the femora robust, the tibiæ robust, cylindrical, each with a large terminal spur; tarsi cylindrical, composed of two joints, the second twice as long as the first; claws two in number, minute, arcuate. The abdominal segments are ten in number, counting the small terminal segment, which bears a small axial anal style composed of seven or eight joints; there are also two short lateral anal stylets, composed of a few closely connate joints; the sutures between the abdominal segments almost concealed by the dense vestiture. The length of the largest specimen examined is 2.5 mm., the greatest width being 0.8 mm.

One of the most remarkable structures distinguishing this larva is a very large fleshy appendage projecting from the lower surface of the abdomen, just behind the fifth segment, and nearly as large as the entire abdominal vertex beyond it. It is mobile about its point of attachment, elongate-oval, longitudinally and very narrowly divided throughout the length, forming two thick elongate cylindro-conical lobes, which are densely, finely pubescent, and provided in addition with long sparse setæ, especially at the sides. The lobes are divided by transverse sutures into six segments, of which the three basal are very large, together occupying four-fifths of the length, the three last small and composing the rapidly acuminate

portion ; at the apex of each there is a very short two-jointed styli-form process. This organ is held in repose in a long very deep excavation extending through the last four or five abdominal segments, so that when at rest it is not distinctly noticeable, its lower surface being continuous with the lower surface of the abdomen. It is apparently an auxiliary organ of locomotion, analogous to the infra-apical process characterizing many well-known staphylinide larvæ ; but no such development as this has to my knowledge been observed before.

Another larva-like object, possibly of a coleopterous nature, was inclosed in the tube containing the only specimens of *Abroteles Beaumonti* which were obtained, but I am very doubtful of its connection in any way with that species ; it seems to be too large and wide and to contain more matter than would suffice for the body of the insect mentioned.

The large well-developed eyes, large securiform maxillary palpi, and elongate 5-jointed tarsi are wonderful characters, almost irreconcilable with what we know of coleopterous larvæ. The following description will perhaps serve for its future recognition :—

Body evenly oblong-elliptical, depressed, with the upper surface broadly, feebly convex, broadly rounded before and behind. The upper surface is strongly reticulate, alutaceous, pale brownish-piceous in color, and covered sparsely with very short robust spinose setæ. The head is deflexed very strongly, reposing upon the under surface of the prothorax ; it is rather large, triangular, the eyes at the sides convex, large, and composed of many coarse convex facets. The antennæ are inserted in very large widely distant foveæ on the front before the eyes, and are defective in the only specimen ; there are four joints remaining, the outer deeply annulated, and showing that there has been at least a terminal process broken therefrom. The epistoma is large and separated by a distinct broadly sinuous suture. The labrum large, subquadrate. Maxillary palpi well developed, with the last joint very large and strongly securiform. The six legs are about equal, rather long and well developed ; coxæ very long, conical, obliquely recumbent posteriorly, the posterior large flat ; femora elongate, flattened ; tibiæ long, cylindrical, with two strong well-developed distant terminal spurs ; tarsi long, very slender, cylindrical, the posterior nearly as long as the tibiæ, distinctly 5-jointed on all the legs, the first and fifth joints elongate, the intermediate short ; claws two in number, well developed, arcuate. The pronotum is much wider than long and longer than the other two parts of the thorax combined, it is finely canaliculate in the middle throughout the length. The abdomen consists of

nine very short segments, the sutures very deep and distinct, the apex with two pairs of very short anal stylets, but without median style. Length 2.4 mm.; width 1.0 mm.

It is possible that this may be an apterous larva-like female imago. The integuments are soft and membranous, the head and upper surface semicoraceous. The mandibles are short stout, alike, and deeply notched and bifid at apex.

The general form of the body somewhat approaches that of the larva of *Syntomium æneum* as figured by Schiödte, but is more elongate and with the sides more parallel.

III.—*Catalogue of Lepidoptera found within Fifty Miles of New York City, with their Food-plants.*

BY WILLIAM BEUTENMÜLLER.

Read October 7, 1889.

The catalogue here presented for publication was begun by me about five years ago, but has been constantly delayed by the numerous additions, and species for verification, which have been reported or submitted to me as having been taken within the limits specified.

In the preparation of this catalogue I have availed myself of the experiences of various collectors in this vicinity; and it is as complete as it can be made in the present state of our knowledge of the local species, although it will be seen that much is yet to be added, especially in the *Tortricidæ* and *Tineidæ*.

Special effort has been made to give as far as possible the food-plants of each species, for the benefit of those who are desirous of rearing the Lepidoptera of the region. For information relating to the species of which the early stages are known, the student is referred to the catalogue of the described transformations of N. Am. Lepidoptera, by Henry Edwards (Bull. No. 35, U. S. Nat. Mus.).

This being the first list of the Lepidoptera of the region ever published, it may possibly contain some inaccuracies, and for such I would ask the indulgence of the entomological fraternity. I would be greatly obliged to those who will inform me of any error they may detect and also of any addition to the species and food-plants that they may be able to make.

I also desire to acknowledge my special indebtedness to the following gentlemen, who have generously assisted me in my work; Rev. George D. Hulst, Messrs. Henry Edwards, Edward Graef, Wm. T. Davis, Fred. Tepper, A. W. P. Cramer, Charles Palm, Charles Leng, and George Gade.

RHOPALOCERA.

PAPILIONIDÆ.

Papilio turnus, L. Food; apple, quince, plum, thorn, cherry, tulip-tree, willow, ash, magnolia, birch, basswood, oak, and alder. Common.

♀ var. **glaucous**, L. Scarce.

Papilio ajax, L. Very rare, only a few specimens ever seen. Food; paw-paw.

Papilio asterias, F. Food; parsley, carrot, dill, parsnip, celery, anise, fennel, and caraway. Common.

var. **Calverleyi**, Grote. A single specimen taken in the neighborhood of new lots, Queens Co., L. I., Aug. 1863. (Proc. Ent. Soc. Phila., II, p. 441.)

Papilio troilus, L. Food; sassafras and spicebush (*Lindera benzoin*). Common.

Papilio chresphontes, Cram. Food; orange, prickly-ash, and hop-tree (*Ptelea*). Rare.

Papilio philenor, L. Food; Dutchman's-pipe and Virginia snakeroot (*Aristolochia*). Not common.

Pieris rapæ, L. Food; cabbage, turnip, mignonette, etc.; but especially injurious to cabbage. Very common.

Pieris oleracea, Har. Food; cabbage, turnip, radish, mustard, etc. Very rare.

Pieris protodice Bd. Food; cabbage, mustard, and *Erigeron canadensis*. Rare.

Anthocharis genutia, F. Food; *Sisymbrium thalianum*, and *Cardamine*. Taken at Delaware Water Gap, Pa., by Mr. C. Palm, also found at Nyack, N. Y., by Mr. G. Beyer.

Callidryas eubule, L. Food; clover and *Cassia*. Very rare. Mr. Henry Edwards tells me that this species appeared in large numbers at Long Branch, N. J., some years ago. Mr. S. I. Smith has taken it abundantly at Fire Island, L. I., N. Y., in 1870. (Am. Nat. IV, p. 761.) Occasional specimens have also been taken on Long Island and Staten Island.

Colias philodice, Godt. Food; clover, pea, lupine, and lucerne. Very common.

♀ var. **alba**. Not common.

Colias eurytheme, Bd. Food; clover. Very rare. One specimen taken at Astoria, L. I., by S. L. Elliot.

Terias lisa, Bd. Food; clover. Not common.

Terias nioippe, Cram. Food; clover and *Cassia Marylandica*. This species appeared in considerable numbers in 1879, in Central Park; but since then only a few occasional specimens have been taken.

NYMPHALIDÆ.

Danaus archippus, F. Food; various species of milk-weeds (*Asclepias*). Very common.

Argynnis idalia, Dr. Food; violets. Common.

Argynnis cybele, F. Food; violets. Common.

- Argynnis myrina**, Cram. Food ; violets and ferns. Common.
- Argynnis bellona**, F. Food ; violets. Not common.
- Euptoleta claudia**, Cram. Food ; violets, sedum, mandrake (*Podophyllum*), passion-flower (*Pussiflora*), and *Desmodium*. Rare.
- Melitaea phaeton**, Dr. Food ; *Lonicera ciliata*, *Chelone glabra*, *Viburnum*, *Gerardia*, *Mimulus*, and *Plantago*. Very local in swampy places.
- var. **phætusa**, Hulst. Rare.
- Phyciodes Harrisii**, Scud. Food ; various species of asters. Rare.
- Phyciodes nyctels**, Doub. Food ; asters, sunflower, and *Actinomeris*. Rare.
- Phyciodes tharos**, Dr. Winter form ; **marcia**, Edw. Summer form ; **morpheus**, Fabr. Food ; different species of asters. Common.
- Grapta interrogationis**, Fabr. Dimorphic form ; **Fabricii**, Edw. Dimorphic form ; **umbrosa**, Lint. Food ; linden, hackberry (*Celtis*), nettle, hop, and elm. Common.
- Grapta comma**, Harr. Winter form ; **Harrisii**, Edw. Summer form ; **dryas**, Edw. Food ; elm, hop, nettle, and hackberry (*Celtis*). Common.
- Grapta progne**, Cr. Food ; currant, elm, and gooseberry. Rare.
- Grapta J-album**, Bd., Lec. Food ; white birch. Very rare. Only one specimen taken on Staten Island by Wm. T. Davis, and one specimen by myself in Central Park.
- Vanessa antiopa**, L. Food ; elm, hackberry, willow, and poplar. Common.
- var. **Lintneri**, Fitch. Rare.
- Vanessa Milberti**, Godt. Food ; nettle. One example taken by me in Central Park in 1883.
- Pyrameis atalanta**, L. Food ; nettle and hop. Common.
- Pyrameis huntera**, Dr. Food ; various species of thistles, nettle, burdock, sunflower, *Malva*, *Senecio cineraria*, *Althæa rosea*, and *Gnaphalium*. Common.
- Pyrameis cardui**, L. Food ; same as the preceding species. Common.
- Junonia cœnia**, Hüb. Food ; *Gerardia*, *Plantago*, and *Antirrhinum canadensis*. Rare.
- Limenitis ursula**, Febr. Food ; willow, poplar, oak, hornbeam, plum, cherry, apple, thorn, gooseberry, and huckleberry. Common.
- Limenitis disippus**, Godt. Food ; willow, poplar, apple, plum, and oak. Common.
- Neonympha eurytris**, F. Food ; grass. Common.
- Neonympha canthus**, L. Food ; grass. Scarce.
- Debis portlandia**, F. Food ; grass. Rare.
- Satyrus alope**, F. Food ; grass. Not common.
- Libythea Bachmannii**, Hüb. Food ; hackberry (*Celtis occidentalis*). Mr. Henry Edwards and myself caught about fifty specimens of this scarce species at Sandy Hook, N. J., in the latter part of August, 1886.

LYCÆNIDÆ.

- Thecla humuli**, Har. Food ; hop and beans. Not common.
- Thecla calanus**, Hüb. Food ; oak, chestnut, hickory, and walnut. Not common.

Thecla strigosa, Har. Food; oak, holly, plum, apple, and thorn. Rare.

Thecla smilacis, Bd. Food; smilax. Taken at Delaware Water Gap by Mr. Palm.

Thecla irus, Godt. Food; huckleberry. Rare.

Thecla niphon, Hüb. Food; pine. Rare.

Fenestica tarquinius, F. Food; plant-lice living on alder. Rare.

Chrysophanus americana, D'Urb. Food, sorrel (*Rumex acetosella*) and clover. Common.

Chrysophanus thoe, Bd., Lec. Food; *Polygonum* and prickly ash. Not common.

Lycæna pseudoargiolus, Bd. Form *lucia*, Kby. Form *violacea*, Edw. Form *marginata*, Edw. Form *neglecta*, Edw. Food; flowers of dogwood (*Cornus*), holly (*Ilex*), *Actinomeris squarrosa*, *Apios tuberosa*, *Erythrina herbacea*, *Spiræa salicifolia*, *Ceanothus americanus*, and *Rubus cuneifolius*. Common.

Lycæna comyntas, Godt. Food; clover, *Desmodium marylandicum*, *Lespedeza capitata*, and *Phaseolus perennis*. Common.

HESPERIDÆ.

Ancyloxypha numitor, F. Food; grasses. Common.

Pamphila massasoit, Sc. Scarce.

Pamphila zabulon, Bd., Lec. Food; grasses. Common.
var. *pocahontes*, Sc. Rare.

Pamphila sassacus, Harr. The food of this species is said to be grass (*Panicum sanguinale*). Rare.

Pamphila leonardes, Harr. Food; grasses. Not rare.

Pamphila otho; var. *egeremet*, Scud. Food; grass. Rare.

Pamphila huron, Edw. Rare.

Pamphila Peckius, Kby. Food; grasses. Common.

Pamphila mystic, Edw. Food; grasses. Rare.

Pamphila cerne, Bd., Lec. Common.

Pamphila manataqua, Scud. Rare.

Pamphila metacomet, Harr. Food; grasses. Rare.

Pamphila delaware, Edw. Food; grasses. Rare.

Pamphila verna, Edw. Food; grass (*Erianthus alopecuroides*). Not rare.

Pamphila pontiac, Edw. Rare.

Pamphila viator, Edw. Rare. Two specimens taken on Long Island.

Pyrgus tessellata, Sc. Rare. One specimen taken on Staten Island by W. T. Davis.

Nisoniades brizo, Bd., Lec. Food; said to be oak and beggar's lice (*Cynoglossum Morisoni*).

Nisoniades icelus, Lintn. Food; aspen. (*Populus*.)

Nisoniades lucillus, Lint. Food; *Aquilegia canadensis*.

Nisoniades juvenalis, Fab. Food; bean (*Apios*), wild indigo (*Baptisia*), *Lathyrus* and *Galactia*.

Nisoniades martiales, Scud. Scarce.

- Pholisora catullus**, Fab. Food; horse-mint (*Monarda*), goose-foot (*Chenopodium*), and ragweed (*Ambrosia*). Common.
- Eudamus pylades**, Seud. Food; clover. Not common.
- Eudamus bathyllus**, A. & S. Food; wild bean (*Apios*) and *Desmodium*. Not common.
- Eudamus lycidas**, Abb. & Sm. Food; various species of *Desmodium*. Taken by Hy. Edwards, at Fort Lee, N. J.; by W. T. Davis, on Staten Island, and by Mr. Tepper, on Long Island.
- Eudamus proteus**, L. Food; butterfly-pea (*Clitoria mariana*) and kidney-bean (*Phaseolus*). Two specimens taken in Central Park by S. L. Elliot.
- Eudamus tityrus**, Fabr. Food; various species of locust. Common.

HETEROCERA.

SPHINGIDÆ.

- Hemaris auxillaris**, G. & R. Rare. Taken by Mr. B. Neumœgen at Morris Plains, New Jersey. Rare.
- Hemaris thysbe**, Fab. Food; various species of viburnum, honeysuckle, snowberry (*Symphoricarpos*), and thorn.
var. **uniformis**, G. & R. Scarce.
var. **floridensis**, G. & R. Very rare. Taken by Mr. B. Neumœgen, at Morris Plains, N. J.
- Hemaris buffalocensis**, Gr. & Rob. Food; various species of viburnum. Scarce.
- Amphion nessus**, Cram. Food; fuchsia, grape, Virginia creeper (*Ampelopsis*), and *Epilobium coloratum*. Not common.
- Thyreus Abbotii**, Swains. Food; grape and Virginia creeper. Common.
- Deidamia inscripta**, Har. Food; grape and Virginia creeper. Not common.
- Deilephila lineata**, Fab. Food; apple, grape, currant, gooseberry, plum, buckwheat, turnip, watermelon, chickweed (*Stellaria*), *Rumex*, evening primrose (*Enothera*), and purslane (*Portulaca*). Common.
- Deilephila chamænerii**, Harr. Food; grape and *Epilobium*. Rare.
- Philampelus pandorus**, Hüb. Food; grape and Virginia creeper. Common.
- Philampelus achemon**, Dr. Food; same as the preceding species. Common.
- Philampelus vitis**, Drury. Food; grape. A single specimen taken by Mr. J. Doll in Brooklyn.
- Chcerocampa tersa**, Linn. Food; *Bouvardia*, button-weed (*Spermacoce glabra*). Rare.
- Everyx choærilus**, Cram. Food; sheep-berry (*Viburnum lentago*), arrow-wood (*V. dentatum*), sour gum (*Nyssa multiflora*), and *Azalea*. Not common.
- Everyx myron**, Cram. Food; grape and Virginia creeper. Common.
- Everyx versicolor**, Harr. Food; button-bush (*Cephalanthus occidentalis*) and *Nesaea verticillata*, L. Rare.
- Smerinthus geminatus**, Say. Food; willow, poplar, elm, apple, cherry, plum, ash. Not common.
var. **jamaicensis** Dr. Rare.

- Smerinthus myops**, A. & S. Food; wild and cultivated cherry. Scarce.
- Smerinthus astylus**, Drury. Food; various species of huckleberry, and wild and cultivated cherry. Rare.
- Paonias exocatus**, A. & S. Food; apple, plum, cherry, *Spiræa opulifolia*, *Rubus odoratus*, *Wisteria*, elm, oak, hazel, hornbeam, birch, willow, poplar, linden, and various species of roses. Common.
- Triptogon modesta**, Harr. Food; poplar and willow. Rare.
- Cressonia juglandis**, A. & S. Food; hickory, walnut, and iron wood (*Ostrya*). It is also said to feed on wild cherry, according to Dr. Packard. Not common.
- Ceratomia amyntor**, Hüb. Food; elm, linden, and birch. Common.
- Daremma undulosa**, Walk. Food; lilac, privet, and ash. Common.
- Daremma jasminiarum**, Bd., Lec. Food; ash and lilac. Scarce.
- Phlegethontius carolina**, L. Food; tomato, potato, tobacco, and Jamestown weed (*Datura stramonium*). Common.
- Phlegethontius celeus**, Hüb. Food; tomato, potato, Jamestown weed, matrimony vine (*Lycium vulgare*) and ground cherry (*Physalis viscosa*). Common.
- Phlegethontius cingulata**, Fab. Food; various species of the convolvulus family: also on Jamestown weed (*Datura*). Rare.
- Sphinx drupiferarum**, A. & S. Food; plum, lilac, apple, cherry. Not common.
- Sphinx kalmiæ**, A. & S. Food; ash, lilac, laurel, and *Chionanthus*.
- Sphinx lucitiosa**, Clem. Food; willow. Very rare.
- Sphinx chersis**, Hüb. Food; lilac and ash. Common.
- Sphinx gordius**, Cram. Food; ash, apple, privet, and *Myrica cerifera*. Not common.
- Sphinx eremitus**, Hüb. Food; mint, wild bergamot, and *Salvia*. Rare.
- Dolba hylæus**, Dr. Food; sweet fern (*Comptonia asplenifolia*). Rare.
- Hylolius plebeius**, Fab. Food; trumpet-vine (*Tecoma radicans*). Not rare.
- Ellema coniferarum**, A. & S. Food; pine. Rare.

ÆGERIADÆ.

- Melittia ceto**, West. Larva in stems of squash and pumpkin vines. Common.
- Aloathæ caudatum**, Harr. Scarce.
- Trochillum apiformis**, L. Larva in canes of willow. Rare.
- Bembecia marginata**, Harr. Larva in canes of blackberry and raspberry. Common.
- Sciapteron pollatiformis**, Harr. Larva in stems of grape-vines. Scarce.
- Fatua denudata**, Harr. Larva in young shoots of ash. Rare. Taken by Mr. B. Neumøgen at Morris Plains, N. J.
- Podosesia syringæ**, Harr. Larva in young shoots of ash and lilac. Common.
- Sannina exitiosa**, Say. Larva in trunks of peach and plum. Common.
- Ægeria plotipes**, G. & R. Larva in trunk of plum. Rare.
- Ægeria pyri**, Harr. Larva in trunk of pear. Scarce. Not common.

- Egeria acerni***, Clem. Larva in trunk of maple. Common.
Egeria tipuliformis, Linn. Larva in stems of currant and gooseberry. Not Common.
Egeria eupatori, Hy. Edw. Larva in stems of *Eupatorium*. Not rare.
Egeria infirma, Hy. Edw. Rare.
Egeria albicornis, Hy. Edw. Scarce. Taken by Mr. B. Neumøgen at Morris Plains, N. J.
Carmenta pyralidiformis, Walk. Not rare. Larva in twigs of beach plum (*Prunus maritima*).

THYRIDÆ.

- Thyris maculata***, Harr. Rare.
Thyris lugubris, Boisd. Rare. Taken at Morris Plains, N. J., by Mr. B. Neumøgen.
Platythyris oculatana, Clem. Rare. Taken by Mr. C. Palm, at Delaware Water Gap, Pa.

ZYGÆNIDÆ.

- Alypia octomaculato***, Fab. Food; grape and Virginia creeper. Common.
Psychomorpha epimensis, Dr. Food; grape and Virginia creeper. Scarce. Taken at Astoria, L. I., and Staten Island.
Eudryas unio, Hüb. Food; evening primrose and *Epilobium coloratum*. Common.
Eudryas grata, Fab. Food; grape.
Scepsis fulvicollis, Hüb. Food; grass. Common.
Ctenucha virginica, Ch. Food; grass. Rare.
Harrisina americana, Harr. Food; grape, Virginia creeper, and *Cercis canadensis*. Not common.
Pyromorpha dimidiata, H.-S. Scarce.
Lycomorpha pholus, Dr. Food; lichens. Not common.

BOMBYCIDÆ.

- Nola ovilla***, Gr. Food; oak. Not common.
Nola sexmaculata, Gr. Scarce.
Argyrophytes cillicoides, Gr. Scarce.
Clemensia albata, Pack. Rare.
Crambidia pallida, Pack. Rare.
Hypoprepia fuscata, Hüb.
 var. *miniata*. Food; lichens on oak trees. Common.
Crocata rubicundaria, Hüb. Scarce.
Crocata opella, Gr. Rare.
Crocata obscura, Stretch. Rare.
Utetheisa bella, L. Food; elm, cherry, *Myrica*, *Crotalaria*, and *Lespedeza*. Common.
Callimorpha olymene, Brown. Rare.

- Platarctia parthenos**, Harr. Food; lettuce and other low plants. Rare.
- Arotia virgo**, L. Food; lettuce, plantain, etc. Not common.
- Arotia phyllira**, Dr. Rare.
- Arctia virguncula**, Kby. Food; *Polygonum*. Rare.
- Arotia nais**, Dr. Food; strawberry, clover, *Polygonum*, *Lepidium*, and various grasses. Common.
- Arctia decorata**, Saund. Food; various species of grasses and other low plants.
- Arctia arge**, Dr. Food; corn, goosefoot (*Chenopodium*), *Plantago*, *Polygonum*, and (*Eurotia biennis*). Common.
- Arctia persephone**, Gr. Rare.
- Phyrrarctia isabella**, A. & S. Food; clover, cabbage, lettuce, spinach, grass, etc. Common.
- Phragmatobia rubricosa**, Harr. Food; iron-weed (*Vernonia noveboracensis*), golden-rod (*Solidago*), *Eupatorium*. Common.
- Leucarctia acræa**, Dr. Food; clover, cabbage, lettuce, spinach, *Ambrosia*, *Lappa*, *Melilotus*, etc. Common.
- Spilosoma virginica**, Fab. Food; cabbage, beets, peas, burdock, *Polygonum*, and a variety of other plants. Common.
- Spilosoma latipennis**, Stretch. Scarce. Taken by me in Fordham, N. Y.
- Spilosoma congrua**, Walk. Scarce. Taken at Parkville, L. I., and West Farms, N. Y., by me, feeding in mushrooms.
- Hyphantria cunea**, Dr.
var. **textor**, Har.
var. **punctata**, Fitch.
Food; clover, apple, pear, cherry, elm, walnut, hickory, hornbeam, oak, basswood, willow, ash, boxwood, alder, locust, lilac, beech, etc. etc. Common.
- Euchæstes egle**, Dr. Food; various species of milkweed (*Asclepias*). Common.
- Euchæstes collaris**, Fitch. Food; dogbane (*Apocynum*). Common.
- Eopantheria scribonia**, Stoll. Food; sunflower, willow, locust, *Plantago*, etc. Scarce.
- Halesidota tessellata**, A. & S. Food; platanus, elm, hornbeam, oak, hazel, maple, huckleberry, beech, basswood, June-berry, locust, witch-hazel, hickory, walnut, ash, and willow. Common.
- Halesidota caryæ**, Harr. Food; elm, ash, walnut, hickory, willow, apple, etc. Common.
- Orgyia leucostigma**, A. & S. Food; oak, chestnut, hazel, beech, elm, maple, sweet-gum, tulip-tree, cherry, apple, pear, plum, rose, June-berry, horse-chestnut, willow, poplar, platanus, basswood, locust, walnut, hickory, fir, spruce, larch, cypress, etc. etc. Common.
- Parorgyia leucophæa**, A. & S. Food; persimmon and oak. Rare. Taken by Mr. B. Neumøgen, at Morris Plains, N. J.
- Parorgyia Clintonii**, G. & R. Food; oak. Rare.
- Parorgyia achatina**, A. & S. Food; oak. Rare.
- Parorgyia parallela**, G. & R. Food; oak, apple, plum, crab-apple, and horse-chestnut. Not common.

- Parorgyia cinnamomea**, G. & R. Food ; walnut.
- Lagoa crispata**, Pack. Food ; apple, pear, plum, basswood, sassafras, alder, willow, oak, blackberry, hazel, sycamore, birch, and *Myrica*. Rare.
- Euclea querceti**, H.-S. Food ; oak, cherry, pear, and willow. Scarce.
- Euclea bifida**, Pack. Scarce.
- Euclea ferruginea**, Pack. Scarce.
- Euclea pænulata**, Clem. Food ; -willow. Rare.
- Parasia chloris**, H.-S. Food ; rose, paw-paw, wild and cultivated cherry, elm, oak, and *Myrica*. Common.
- Parasia fraterna**, Gr. Food ; wild and cultivated cherry, oak, hickory, etc. Not common.
- Monoleuca semifascia**, Walk. Rare.
- Empretia stimulea**, Clem. Food ; oak, asters, sweet-gum, viburnum, rose, apple, cherry, raspberry, blackberry, Juneberry, corn, sumac, horse-briar (*Smilax*), huckleberry, etc. Common.
- Phobetron pithecium**, A. & S. Food ; apple, cherry, oak, chestnut, hazel, and button-bush (*Cephalanthus*). Scarce.
- Limacodes scapha**, Harr. Food ; cherry, apple, Juneberry (*Amelanchier canadensis*), hickory, walnut, and *Myrica cerifera*. Common.
- Limacodes biguttata**, Pack. Rare.
- Limacodes Y-inversa**, Pack. Scarce.
- Limacodes rectilinea**, G. & R. Rare.
- Limacodes fasciola**, H.-S. Food ; maple. Not common.
- Limacodes flexuosa**, Gr. Food ; cherry, plum, and apple. Scarce.
- Sisyrosea inornata**, G. & R. Food ; cherry, chestnut, oak, and *Myrica*. Scarce.
- Adonetia spinuloides**, H. & G. Food ; honey-locust, plum, cherry, Juneberry, oak, chestnut, birch, and *Myrica*. Common.
- Adonetia leucosigma**, Pack. Scarce.
- Packardia albipunctata**, Pack. Scarce.
- Tortrioidia testacea**, Pack. Scarce.
- Psyche confederata**, Gr. Food ; chestnut. Not common.
- Thyridopteryx ephemæformis**, Steph. Food ; apple, quince, plum, pear, oak, beech, elm, willow, poplar, locust, hornbeam, persimmon, sassafras, sycamore, cypress, juniper, larch, hemlock, arbor-vitæ, etc. Common.
- Perophora Melsheimeri**, Harr. Food ; oak. Scarce. A single specimen taken by Hy. Edward, at Woodlawn, N. Y.
- Ichthyura inclusa**, Hüb. Food ; poplar and willow. Common.
- Ichthyura vau**, Fitch. Food ; willow. Rare.
- Ichthyura albosigma**, Fitch. Food ; willow and poplar. Rare.
- Apateloides torrefacta**, A. & S. Food ; blackberry, alder, willow, viburnum, and *Myrica*. Not common.
- Apateloides angelica**, Gr. Food ; ash and lilac. Rare. A single specimen was captured by C. Palm, at Lake Hopatcong, N. J.
- Datana ministra**, Dr. Food ; apple, pear, quince, cherry, birch, oak, beech, hornbeam, hazel, chestnut, and hickory. Common.

- Datana Drexelli**, Hy. Edw. Food ; huckleberry and witch-hazel. Common.
- Datana Angustii**, Gr. & Rob. Food ; hickory and walnut. Common.
- Datana integerrima**, G. & R. Food ; walnut, butternut, hickory, oak, and beech. Common.
- Datana contracta**, Walk. Food ; hickory, oak, and chestnut. Common.
- Datana perspicua**, G. & R. Food ; sumach. Common.
- Nadata gibbosa**, A. & S. Food ; maple and oak. Common.
- Hyparpax aurora**, A. & S. Food ; oak. Not common.
- Gluphisia trilineata**, Pack. Food ; willow. Not common.
- Notodonta strangula**, Gr. Food ; willow. Not common.
- Notodonta basitriens**, Walk. Not common.
- Notodonta rimosa**, Pack. Not common.
- Notodonta ferruginea**, Pack. Not common.
- Notodonta georgica**, H.-S. Not common.
- Notodonta angulosa**, A. & S. Food ; oak. Not common.
- Nerice bidentata**, Walk. Food ; elm. Scarce.
- Seirodonta bilineata**, Pack. Food ; elm. Not common.
- Cedemasia concinna**, A. & S. Food ; apple, pear, quince, blackberry, plum, willow, sweet-gum, persimmon, hickory, dogwood, etc. Common.
- Cedemasia eximia**, Gr. Food ; apple. Rare. Found by Mr. Hy. Edward, at Morris Plains, N. J.
- Cedemasia badia**, Pack. Rare. Taken by Hy. Edw., at Morris Plains, N. J.
- Pheosia rimosa**, Pack. Food ; willow. Not common.
- Edema albifrons**, A. & S. Food ; oak. Common.
- Dasylophia anguina**, A. & S. Food ; locust and *Lespedeza*. Not common.
- Cœlodasys unicoloris**, A. & S. Food ; locust, plum, apple, thorn, cherry, dogwood, alder, winterberry (*Ilex*), hazel, oak, etc. Common.
- Cœlodasys leptinoides**, Gr. Food ; walnut. Rare. Found by Mr. B. Neumegen, at Morris Plains, N. J.
- Cœlodasys biguttata**, Pack. Food ; honey-locust. Not common.
- Heterocampa obliqua**, Pack. Rare.
- Heterocampa marthesia**, Cram. Not common.
- Heterocampa guttivitta**, Walk. Not common. Taken by Hy. Edwards, at Scarsdale, Westchester Co., N. Y.
- Heterocampa biundata**, Walk. Not common.
- Heterocampa unicolor**, Pack. Food ; maple. Not common.
- Heterocampa subalbicans**, Gr. Rare. Taken at Fordham, N. Y., by Mr. G. Gade.
- Heterocampa pulvereæ**, G. & R. Food ; oak. Not common.
- Cerura borealis**, Boisd. Food ; willow, poplar, and wild cherry. Not common.
- Cerura occidentalis**, Lint. Food ; willow and poplar. Not common.
- Cerura aquilonaris**, Lint. Rare.
- Cerura cinerea**, Walk. Food ; willow and poplar. Common.
- Platypteryx arcuata**, Walk. Food ; white birch. Not common.
- Dryopteris rosea**, Walk. Food ; *Viburnum acerifolium* and *V. lentago*.

- Actias luna**, Linn. Food ; walnut, hickory, maple, birch, sweetgum, etc. Common.
- Telea polyphemus**, Cram. Food ; basswood, maple, oak, hornbeam, hazel, cherry, plum, apple, quince, pear, thorn, elm, willow, poplar, hickory, sycamore, birch, locust, etc. Common.
- Samia cynthia**, Dr. Food ; *Ailanthus*, sassafras, basswood, tulip-tree, wild cherry, plum, dogwood, lilac, castor bean, and *Viburnum lentago*. Very common.
- Callosamia promethia**, Dr. Food ; sassafras, basswood, wild cherry, lilac, tulip-tree, sweet-gum, ash, birch, apple, plum, magnolia, buttonbush, barberry, maple, hornbeam, azalia, snowdrop tree (*Halesia tetraptera*), etc. Common.
- Callosamia angulifera**, Walk. Food ; tulip-tree, sassafras, and wild cherry. Not common.
- Platysamia cecropia**, L. Food ; maple, elder, willow, poplar, elm, oak, alder, hornbeam, hazel, blackberry, apple, pear, plum, cherry, quince, barberry, currant, etc. Common.
- Hypercheria io**, Fab. Food ; rose, apple, pear, cherry, blackberry, oak, hazel, hornbeam, beech, elm, maple, willow, poplar, clover, Wisteria, carrot, etc. Common.
- Eacles imperialis**, Dr. Food ; basswood, sumac, maple, honey-locust, wild cherry, sweet-gum, sassafras, elm, sycamore, oak, beech, hornbeam, birch, alder, pine, spruce, cedar, cypress, and juniper. Common.
- Citheronia regalis**, Fab. Food ; sumac, sweet-gum, sycamore, hickory, walnut, butternut, ash, and persimmon. Not common.
- Anisota stigma**, F. Food ; oak, hazel, and chestnut. Common.
- Anisota senatoria**, A. & S. Food ; oak, chestnut, and hazel. Common.
- Anisota virginiensis**, Dr. Food ; oak. Not common.
- Anisota rubicunda**, Fab. Food ; maple. Common.
- Clisiocampa americana**, Harr. Food ; apple, plum, wild and cultivated cherry. Common.
- Clisiocampa disstria**, Hüb. Food ; Juneberry, apple, plum, cherry, ash, oak, poplar, walnut, hickory, etc. Not common.
- Gastropacha americana**, Harr. Food ; celtis, apple, cherry, poplar, maple, and birch. Not common.
- Artace punctistriga**, Walk. Food ; oak. Very rare. Taken on Long Island by Mr. Tepper.
- Tolype velleda**, Stoll. Food ; cherry, apple, poplar, lilac, oak, elm, etc. Common.
- Tolype laricia**, Fitch. Food ; pine and larch. Rare.
- Prionoxystus robiniae**, Peck. Larva bores in the trunks of oak, willow, locust, chestnut, and poplar. Common.
- Hepialus argenteomaculatus**, Harr. Larva in stems of alder. Rare.
- Zeuzera ceculi**, L. Taken in numbers at Newark, N. J., by Mr. Angleman, who has also detected the larva boring in twigs of elm ; also found by me in Central Park. Rather common.

NOCTUIDÆ.

Leptina dormitans, Guén. Rare.

Leptina Doubledayi, Guén. Rare.

Thyatira pudens, Guén. Rare.

Pseudothyatira oymatophoroides, Guén.

var. **epultrix**, Gr. Food; maple, oak. Common.

Habrosyne scripta, GOSSE. Food; raspberry and blackberry. Common.

Platycerura furcilla, Pack. Food; pine. Rare.

Charadra propinquinnea, Gr. Food; birch (*Betula alba*), walnut, maple, and oak. Not common.

Charadra deridens, Guén. Food; birch, elm, oak, etc. Not common.

Raphia frater, Gr. Food; poplar and willow. Not common.

Feralia jocosa, Guén. Food; pine. Taken at Newark, N. J., by Mr. Angleman.

Diphthera fallax, H.-S. Not common.

Apatela vinnula, Gr. Food; elm.

Apatela paupercula, Gr. Rare.

Apatela exilis, Gr. Rare.

Apatela grisea, Walk. Food; elm and walnut. Rare.

Apatela occidentalis, G. & R. Food; wild cherry, plum, apple, elm, etc. Common.

Apatela dactylina, Gr. Food; willow, alder, white birch. Not common.

Apatela lobeliæ, Guén. Food; oak, wild cherry, etc. Not common.

Apatela innotata, Guén. Rare.

Apatela hastulifera, A. & S. Food; alder and maple. Scarce.

Apatela americana, Harr. Food; maple, oak, beech, chestnut, hornbeam, ash, sycamore, basswood, elm, poplar, willow, birch, alder, horse-chestnut, etc. Common.

Apatela rubricoma, Guén. Food; hackberry (*Celtis occidentalis*). Not common. ●

Apatela luteicoma, G. & R. Food; apple, pear, plum, cherry, basswood, ash, oak, walnut, and maple. Not common.

Apatela brumosa, Guén. Food; blackberry, raspberry, apple, pear, plum, cherry, poplar, willow, hazel, oak, and birch. Common.

Apatela noctivaga, Gr. Food; poplar. Not common.

Apatela superans, Guén. Food; cherry, plum, and hazel. Not common.

Apatela afflicta, Gr. Food; oak and walnut. Not common.

Apatela clarescens, Guén. Food; apple, cherry, and blackberry. Common.

Apatela ovata, Gr. Common.

Apatela hamamelis, Guén. Food; oak, chestnut, hazel, witch-hazel, etc. Common.

Apatela dissecta, G. & R. Not common.

Apatela sperata, Gr. Not common.

Apatela xyliniformis, Guén. Food; birch, blackberry, etc. Not common.

Apatela lithospila, Gr. Food; hickory. Not common.

- Apatela oblnita**, A. & S. Food ; willow, alder, poplar, button-bush, apple, strawberry, raspberry, blackberry, pear, corn, oak, hazel, butternut, elm, alder, etc. Common.
- Arsilonche albovenosa**, Gr. Food ; *Polygonum*. Common.
- Harrisimemna trisignata**, Walk. Food ; lilac, huckleberry and *Prinos verticillata*. Scarce.
- Polygrammate hebraicum**, Hüb. Scarce.
- Microcœlia diphtheroides**, Guén. Scarce.
var. *obliterata*, Gr. Not common.
- Bryophila lepidula**, Gr. Rare.
- Bryophila teratophora**, H.-S. Rare.
- Chytonix palliatricula**, Guén. Scarce.
- Agrotis dilucida**, Morr. Rare. Taken by W. T. Davis, on Staten Island, N. Y.
- Agrotis opacifrons**, Gr. Rare.
- Agrotis attenta**, Gr. Rare.
- Agrotis phyllophora**, Gr. Not common.
- Agrotis baja**, S. V. Common.
- Agrotis Normaniana**, Gr. Not common.
- Agrotis C-nigrum**, Linn. Food ; cabbage, lettuce, spinach, grasses, etc. etc.
- Agrotis bicarnea**, Guén. Food ; chicory, lettuce, grasses, etc. Common.
- Agrotis subgothica**, Haw. Food ; corn. Common.
- Agrotis herilis**, Gr. Food ; corn. Common.
- Agrotis plecta**, L. Food ; celery, lettuce, spinach, grass, etc. Common.
- Agrotis cupida**, Gr. Food ; grape. Not common.
- Agrotis alternata**, Gr. Not common.
- Agrotis brunneicollis**, Gr. Not common.
- Agrotis clandestina**, Harr. Food ; apple, currant, gooseberry, buckwheat, corn, pumpkin, cabbage, spinach, lettuce, grass, wheat, etc. Common.
- Agrotis messoria**, Harr. Food ; potato, cabbage, corn, apple, spinach, onion, lettuce, etc. Common.
- Agrotis murænula**, G. & R. Not common.
- Agrotis bostoniensis**, Gr. Not common.
- Agrotis pitychrous**, Gr. Food ; various species of maritime grasses. Common.
- Agrotis tessellata**, Harr. Food ; corn. Common.
- Agrotis badinoides**, Gr. Common.
- Agrotis geniculata**, Gr. & R. Rare.
- Agrotis velleripennis**, Gr. Not common.
- Agrotis venerabilis**, Rare.
- Agrotis fumalis**, Gr. Rare.
- Agrotis mimallonis**, Gr. Not common.
- Agrotis manifesta**, Morr. Rare.
- Agrotis gladiaria**, Morr. Rare. Taken on Staten Island by W. T. Davis.
- Agrotis acollivis**, Morr. Rare.
- Agrotis stigmosa**, Morr. Rare.

- Agrotis annexa**, Tr. Food ; *Polygonum*, cabbage, peas, beans, etc. Rare.
- Agrotis ypsilon**, Rott. Food ; corn, tomato, cabbage, spinach, chicory, grass, tobacco, etc. etc. Common.
- Agrotis saucia**, Hüb. Food ; same as the preceding species. Common.
- Agrotis incivis**, Guén. Rare. Collected at Fordham, N. Y., by Mr. G. Gade.
- Agrotis occulta**, Hüb. Not common.
- Agrotis prasina**, F. Not common.
- Anytus sculptus**, Gr. Not common.
- Mamestra purpurissata**, Gr. Not common.
- Mamestra nimbosa**, Guén. Not common.
- Mamestra imbrifera**, Guén. Not common.
- Mamestra latex**, Guén. Not common.
- Mamestra adjunctata**, Bd. Food ; golden-rod (*Solidago*) and *Pteris aquilegia*.
- Mamestra lubens**, Gr. Rare.
- Mamestra rosea**, Harv. Rare.
- Mamestra picta**, Harr. Food ; willow, corn, cabbage, turnip, peas, spinach, lettuce, golden-rod, *Polygonum*, etc.
- Mamestra grandis**, Bd. Food : burdock. Rare.
- Mamestra subjuncta**, G. & R. Food ; cabbage. Common.
- Mamestra distincta**, Hüb. Food ; grape, etc. Not common.
- Mamestra confusa**, Hüb. Not common.
- Mamestra trifolii**, Rott. Food ; clover, *Chenopodium album*, etc. Common.
- Mamestra meditata**, Gr. Common.
- Mamestra renigera**, Steph. Food ; chicory and various species of grasses, etc.
- Mamestra lorea**, Guén. Food ; geranium, strawberry, etc. Common.
- Mamestra olivacea**, Morr. Rare.
- Luceria passer**, Guén. Rare.
var. *conspicua*, Morr. Rare.
- Luceria delicata**, Gr. Rare.
- Hadena devastatrix**, Br. Food ; cabbage, corn, lettuce, and various other low plants. Common.
- Hadena arctica**, Bd. Food ; corn, cabbage, spinach, lettuce, grass, etc. etc. Common.
- Hadena dubitans**, Walk.
- Hadena sputatrix**, Gr. Common.
- Hadena apamiformis**, Guén. Not common.
- Hadena lignicolor**, Guén. Common.
- Hadena verbascoides**, Guén.
- Hadena vulgaris**, G. & R. Not common.
- Hadena remissa**, Hüb.
- Hadena finitima**, Guén. Common.
- Hadena impulsu**, Guén. Not common.
- Hadena mactata**, Guén. Not common.
- Hadena diversicolor**, Morr. Rare.
- Hadena turbulenta**, Hüb. Food ; horsebriar (*Smilax*). Common.

- Hadena miselloides**, Guén.
Hadena modica, Guén. Common.
Hadena sectilis, Guén. Rare.
Oligia arna, Guén. Not common.
Perigea xanthioides, Guén.
Perigea luxa, Gr. Common.
Perigea infelix, Guén. Not common.
Perigea fabrefacta, Morr. Common.
Dipterygia scabriuscula, Linn. Food; *Rumex*. Common.
Hyppa xylinoides, Guén. Common.
Homohadena badistriga, Gr. Food; honeysuckle. Rare.
Oncocnemis Chandleri, Gr. Rare.
Laphygma frugiperda, A. & S. Food; wheat, rye, corn, apple, grass, etc. Scarce.
Prodemia commelinæ, A. & S. Food; wheat, corn, rye, grass, etc. Scarce.
Prodemia flavimédia, Harv. Food; corn, wheat, etc. Common. Taken by Mr. W. T. Davis, on Staten Island.
Prodemia lineatella, Harv. Food; salsify, peach, raspberry, etc. Scarce.
Trigonophora periculosa, Guén.
 var. **V-brunneum**, Gr. Not common.
Euplexia lucipara, L. Food; birch, *Viburnum*, etc. Common.
Brotolomia iris, Guén. Not common.
Nephelodes minians, Guén. Common.
 var. **violans**, Guén. Food; corn, grass, buckwheat, etc.
Helotropha reniformis, Gr. Common.
 var. **atra**, Gr. Common.
Apamea purpuripennis, Gr.
Apamea sera, G. & R.
Apamea nictitans, Bkh.
 var. **erythrostigma**, Haw. Not common.
Apamea immanis, Guén. Food; hop-vine. Not common.
Gortyna impecuniosa, Gr. Rare.
Gortyna cataphracta, Gr. Larva in stems of tiger-lily and thistle. Scarce.
Gortyna purpurifascia, G. & R. Scarce.
Gortyna speciosissima, G. & R. Rare. Taken in Brooklyn, N. Y., by Rev. G. D. Hulst.
Gortyna limpida, Guén. Rare.
Gortyna nitela, Guén. Food; the larva in stems of burdock, wheat, corn, tomato, currant, potato, asters, spinach, salvia, rhubarb, strawberry, lilies, dahlias, *Ambrosia*, etc. Common.
Achatodes zææ, Har. Food; larva in stems of elder. Common.
Arzama obliquata, G. & R. Larva in the stems of *Sagittaria* and *Typha latifolia*. Common.
Scollococampa liburna, Gey. Food; decaying wood of cherry, hickory, and oak. Not common.
Amolita fessa, Gr. Not common.

- Doryodes acutaria**, H.-S. Not common.
Platysenta atriciliata, Gr. Not common.
Ommatostola Lintneri, Gr. Rare.
Heliophila pallens, L. Food ; various species of grasses. Common.
Heliophila albilinea, Hüb. Food ; wheat, grass, corn, etc. Common.
Heliophila phragmitidicola, Guén. Food ; grass, wheat, etc. Common.
Heliophila adonea, Gr. Common.
Heliophila commoides, Guén. Common.
Heliophila flabilla, Gr.
Heliophila unipuncta, Harv. Food ; timothy, wheat, oats, clover, grass, strawberry, *Ambrosia*, *Chenopodium*, etc. etc. Common.
Heliophila pseudargyria, Guén. Food ; grass, corn, wheat, oats, timothy, etc. Common.
Caradrina miranda, Gr. Not common.
Caradrina multifera, Walk. Not common.
Pyrophila pyramidoides, Gr. Food ; plum, raspberry, Juneberry (*Ame-lanchier*), oak, chestnut, Judas-tree (*Cercis canadensis*), sweet-gum, lilac, grape, hickory, etc. etc. Common.
Orthodes infirma, Guén. Common.
Orthodes cynoia, Guén. Common.
Orthodes enervis, Guén. Not common.
Tæniocampa oviduca, Guén. Common.
Tæniocampa modesta, Morr. Not common.
Tæniocampa confluens, Morr. Not common.
Tæniocampa incerta, Hüb. Not common.
Crocigrapha Normani, Gr. Scarce.
Morrisonia evicta, Gr. Not common.
Morrisonia vomerina, Gr. Not common.
Orthosia ferrugineoides, Guén. Not common.
Orthosia aurantiago, Guén. Not common.
Orthosia helva, Gr. Common.
Orthosia lutosa, Andr. Scarce.
Glæa inulta, Gr. Not common.
Epiglæa pastillicans, Morr.
Epiglæa sericea, Morr. Not common. Taken at Fort Lee, N. J. (W. B.).
Eucirroedia pampina, Guén. Not common.
Scoliopteryx libatrix, L. Food ; willow and poplar. Common.
Xanthia togata, Esp. Rare.
Scopelosoma Pettiti, Gr. Not common.
Scopelosoma Græfiana, Gr. Not common.
Scopelosoma ceromatica, Gr. Not common.
Scopelosoma Morrisoni, Gr. Food ; oak.
Scopelosoma Moffatiana, Gr. Food ; witch-hazel.
Litholomia napæa, Morr. Scarce.
Lithophane petulca, Gr. Rare.
Lithophane ferrealis, Gr. Rare.

- Lithophane signosa**, Walk. Rare.
- Lithophane Bethunei**, G. & R. Food ; apple. Not common.
- Lithophane antennata**, Walk. Food ; apple, cherry, poplar, willow, and hickory. Common.
- Lithophane laticinerea**, Gr. Food ; wild cherry. Rare.
- Lithophane querquera**, Gr. Rare.
- Lithophane unimodia**, Lint. Rare. Taken on Staten Island by Mr. W. T. Davis.
- Calocampa nupera**, Lint. Rare.
- Cucullia convexipennis**, Gr. & Rob. Food ; golden-rod (*Solidago*). Not common.
- Cucullia asteroides**, Guén. Food ; golden-rod. Not common.
- Adipsophanes misellus**, Gr. Food ; *Verbena*. Not common.
- Crambodes talidiformis**, Guén. Food ; verbena. Common.
- Nolaphana malana**, Fitch. Food ; apple. Not common.
- Nolaphana Zelleri**, Gr. Not common.
- Anomis erosa**, Hüb. Food ; various species of the mallow family. Not common.
- Aletia argillacea**, Hüb. Food ; cotton and swamp mallow (*Hibiscus moschatus*). Taken in numbers around electric lights in the streets of New York City, Oct. 1887. Common.
- Eutelia pulcherrima**, Gr. Rare.
- Marasmalus ventilator**, Gr. Rare.
- Marasmalus histrio**, Gr. Rare.
- Ingura præpilata**, Gr. Food ; sweet-gum. Not common.
- Ingura oculatrix**, Guén. Rare.
- Calpe canadensis**, Beth. Food ; meadow-rue (*Thalictrum*). Not common.
- Plusiodonta compressipalpis**, Guén. Food ; (*Menispermum canadense*). Not common.
- Phiprosopus callitrichoides**, Gr. Not common.
- Telesilla cinereola**, Guén. Food ; rag-weed (*Ambrosia*), bean, etc. Common.
- Abrostola urentis**, Guén. Rare.
- Deva purpurigera**, Walk. Rare.
- Plusia ærea**, Hüb. Not common.
- Plusia contexta**, Gr. Rare.
- Plusia thyatiroides**, Guén. Rare.
- Plusia verruca**, Fabr. Rare.
- Plusia dyaus**, Gr. Food ; geranium, wandering-jew, and *Eupatorium*. Not common.
- Plusia biloba**, Steph. Rare.
- Plusia precatonis**, Guén. Food ; burdock, dandelion, thistle, hollyhock, and plantain. Common.
- Plusia laticlavata**, Morr. Rare.
- Plusia ni**, Hüb. Food ; celery, turnip, dandelion, cabbage, radish, clover, mustard, tomato, rhubarb, *Chenopodium*, *Senecio*, etc. Common.

- Plusia oxygramma**, Gey. Rare.
Plusia epigæa, Gr. Rare.
Plusia simplex, Guén. Food; dandelion, cabbage, grass, etc. Common.
Plusia mortuorum Guén. Rare.
Plagiomimicus pityochromus, Gr. Not common.
Schinia trifascia, Hüb. Rare.
Rhodophora florida, Guén. Food; evening primrose (*Oenothera*). Not common.
Derrima henrietta, Gr. Rare.
Tamila nudina, Dr. Not common.
Heliothis armiger, Hüb. Food; corn, cotton, tomato, pea, bean, pumpkin, squash, pepper, hemp, etc. Common.
Heliothis spinosa, Guén. Scarce. Taken at Sandy Hook, N. J., and Rockaway Beach, L. I. (W. B.)
Lygranthœcia rivulosa, Guén. Common.
Anthœcia lynx, Guén. Rare.
Anthœcia brevis, Gr. Rare.
Anthœcia arcifera, Guén. Not common.
Anthœcia Spraguei, Gr. Common.
Pyrrhia exprimens, Walk. Food; *Desmodium* and blackberry. Not common.
Tarache erastrioides, Guén. Food; rag weed (*Ambrosia*) and burdock.
Tarache candeacta, Hüb. Food; rag-weed (*Ambrosia*) and burdock.
Tarache delecta, Walk. Food; swamp mallow (*Hibiscus moschatatus*).
Tarache terminimaculata, Gr.
Lithacodia bellicula, Hüb.
Chamyris cerintha, Tr. Food; apple. Common.
Eustrotia concinnimaculata, Guén.
Eustrotia synochitis, G. & R. Common.
Eustrotia olivula Guén. Common.
Eustrotia musta, Gr. & R. Common.
Eustrotia musculosa, Guén. Common.
Eustrotia carneola, Guén. Food; rhubarb and *Polygonum*.
Eustrotia apicosa, Haw. Common.
Herrichia mollisima, Guén. Rare.
Herrichia monetifera, Guén. Rare.
Prothymia cœcineifascia, Gr. Rare.
Prothymia rosalba, Gr. Rare.
Metoponia obtusa, H.-S.
Galgula hepara, Guén. Not common.
Galgula subpartita, Guén. Not common.
Drasteria erechtea, Cram. Food; clover, grass, etc. Common.
Hypocala Hillii, Lint. Rare.
Euclida cuspidata, Hüb. Rare.
Syneda graphica, Hüb. Common. Taken at Rockaway Beach, L. I., and Staten Island.

- Catocala epione**, Dr. Food; oak.
Catocala agrippina, Strk. Rare.
Catocala lacrymosa, Guén. Rare.
 var. **emilia**, Hy. Edw. Rare.
Catocala mæstosa, Hulst. (**vidua**, Guén.). Food; walnut. Rare.
Catocala vidua, A. & S. (**desperata**, Guén.). Food; oak, hickory, and walnut. Common.
Catocala resecta, Gr. Food; hickory. Not common.
Catocala Robinsonii, Gr. Food; hickory. Not common.
Catocala Angusii, Gr. Food; hickory. Not common.
Catocala obscura, Strk. Food; hickory.
 var. **residua**, Gr. Common.
Catocala insolabilis, Guén. Food; hickory. Rare.
Catocala tristis, Edw. Rare.
Catocala relicta, Walk.
 var. **bianea**, Hy. Edw.
 var. **phrynia**, Hy. Edw. Rare.
 Food; white-birch and silver poplar.
Catocala amatrinx, Hüb. Food; willow and poplar. Common.
Catocala cara, Guén. Food; willow and poplar.
 var. **carissima**, Hulst. Rare.
 var. **sylvia**, Hy. Edw. Rare.
Catocala concumbens, Walk. Food; willow and poplar. Common.
Catocala unijuga, Walk. Food; poplar and willow. Not common.
Catocala briseis, Edw. Rare.
Catocala parta, Guén. Food; willow and poplar. Common.
Catocala ultronis, Hüb.
 var. **adriana**, Hy. Edw.
 var. **mopsa**, Hy. Edw.
 Food; apple, plum, wild cherry, dogwood, and oak. Common.
Catocala marmorata, Edw. Rare.
Catocala illia, Cram. Food; oak. Common.
Catocala innubens, Guén. Food; walnut. Common.
Catocala cerogama, Guén. Common.
Catocala neogama, A. & S. Food; walnut. Common.
Catocala subnata, Gr. Food; walnut and hickory. Common.
Catocala piatrix, Gr. Food; walnut, hickory, and persimmon. Common.
Catocala paleogamma, Guén.
 var. **phalanga**. Food; walnut, hickory. Common.
Catocala habilis, Gr.
 var. **basalis**, Gr. Food; hickory. Not common.
Catocala nebulosa, Edw. Not common.
Catocala mullercula, Guén. Food; wax myrtle (*Myrica*). Not common.
Catocala badia, G. & R. Food; wax myrtle (*Myrica*). Rare.
Catocala antinympha, Hüb. Not common.
Catocala serena, Edw. Food; hickory and walnut. Not common.
Catocala polygama, Guén. Food; thorn. Common.

- Catocala crataegi**, Saund. Food; thorn. Rare.
Catocala amasia, A. & S. Food; oak? Rare.
Catocala praeclara, G. & R. Not common.
Catocala grynea, Cram. Food; apple and plum. Common.
Catocala gracilis, Edw.
 var. **sordida**, Gr.
Catocala minuta, Edw. Food; locust. Rare.
Catocala amica, Hüb. Food; oak. Common.
Allotria elonympha, Hüb. Walnut, *Glycine*. Not common.
Parthenos nubilis, Hüb. Food; locust. Common.
Phoberia atomaris, Hüb. Common.
Celiptera frustuluna, Guén. Not common.
Pseudolimacodes littera, Guén. Rare.
Parallela bistriaris, Hub. Food; maple. Common.
Panopoda carneicosta, Guén. Food; oak, hickory, and willow. Not common.
Panopoda rufimargo, Hüb. Food; oak and willow. Not common.
Remigia latipes, Guén. Food; *Hypericum*. Not common.
Remigia hexastylus, Harv. Not common.
Poaphila quadrifilaris, Hüb. Not common.
Erebus odora, L. Rare.
Zale horrida, Hub. Common.
Homoptera edusa, Dr. Common.
 var. **Saundersii**, Beth. Rare.
 var. **lunata**, Dr. Common.
 Food; maple, willow, plum, rose, etc.
Homoptera galbanata, Morr. Rare.
Homoptera penna, Morr. Not common.
Homoptera unilineata, Gr. Rare.
Ypsia undularis, Dr.
Homopyralis tactus, Gr. Common.
Homopyralis tantillus, Gr. Not common.
Spargoloma sexpunctata, Gr.
Spargoloma umbrifascia, Gr.
Pangrapta decoralis, Hub. Not common.
Phalænostola larentioides, Gr. Not common.
Pseudoglossa lubricalis, Géy. Food; various species of grasses. Common.
Pseudoglossa scobialis, Gr. Not common.
Epizeuxis æmula, Hüb. Food; spruce. Common.
Epizeuxis americana, Guén. Food; *Hedysarum*, sweet clover, etc. Common.
Megachyta lituralis, L.
Megachyta deceptricalis, Zell.
Litognatha nubilifascia, Gr.
Litognatha litophora, Gr.
Chytolita morbidalis, Guén. Food; grass, hazel, etc.
Zanclognatha lævigata, Gr.

- Zanclognatha ochreipennis**, Gr.
Zanclognatha oruralis, Guén. Common.
Philometra longilabris, Gr.
Philometra serraticornis, Gr. Food; roots of various species of grasses.
Rivula propinqualis, Guén. Common.
Palthis angulalis, Hüb. Common.
Palthis asopialis, Guén. Common.
Phalenophana rurigena, Gr.
Capis curvata, Gr.
Renia discoloralis, Guén.
Renia brevirostralis, Gr.
Renia larvalis, Gr. Common.
Renia Belfragei, Gr. Common.
Bleptina caradrinalis, Guén.
Hypena baltimoralis, Guén. Food; maple.
Hypena scutellaris, Gr. Not common.
Hypena manalis, Walk. Not common.
Hypena bijugalis, Walk. Not common.
Hypena abalienalis, Walk. Not common.
Hypena achatinalis, Zell. Not common.
Hypena toreuta, Gr. Not common.
Hypena profecta, Gr. Not common.
Hypena deceptalis, Walk. Not common.
Hypena scabra, Fab. Food; clover and hop. Common.
Eulintneria bifidalis, Gr. Rare.

GEOMETRIDÆ.

- Chcerodes clemataria**, A. & S. Food; elm, *Clematis*.
Chcerodes transversata, Dr. Food; currant, maple, wax-myrtle (*Myrica*),
Clethra alnifolia, *Polygonum*, and *Lepidium virginicum*. Common.
Chcerodes furciferata, Pack. Rare.
Tetracis crocallata, Guén. Food; sumach, chestnut, and spice-bush
(*Lindera*). Common.
Tetracis lorata, Gr. Food; sweet fern (*Comptonia asplenifolia*), and hem-
lock. Common.
Metanema quercivoraria, Guén. Food; oak, willow, poplar, and elm.
Metanema inatomaria, Guén. Food; poplar. Not common.
Metanema carnaria, Pack.
Drepanodes puber, G. & R. Rare.
Drepanodes varus, G. & R. Food; juniper. Rare.
Caberodes confusaria, Hüb. Food; clover. Common.
Ennomos alniaria, L. Food; birch, chestnut, linden, lilac, elm, etc.
Common.
Eudalimia subsignaria, Hüb. Food; elm, poplar, willow, basswood, and
apple. Common.

Selenia kentaria, Gr. & Rob. Food ; maple, birch, beech, oak, and bass-wood. Scarce.

Selenia aloiphearia, Walk. Rare.

Azelina Hubnerata, Guén. Food ; maple. Common.

Endropia serrata, Dr. Not common.

Endropia obtusaria, Hüb. Food ; touch-me-not (*Impatiens noli-me-tangere*).

Endropia effectaria, Walk. Not common.

Endropia pectinaria, W. V. Food ; oak and poplar.

Endropia bilinearia, Pack. Food ; oak, cherry, etc. Not common.

Endropia armataria, H.-S. Food ; currant. Not common.

Endropia amœnaria, Guén. Common.

Endropia vinulentaria, G. & R. Scarce.

Endropia marginata, Minot. Scarce.

Endropia homuraria, G. & R.

Endropia hypocharia, H.-S. Common.

Therina fervidaria, Hüb. Food ; beech, birch, cherry, elm, spruce, etc. Common.

Therina endropiaria, G. & R. Food ; hornbeam and oak.

Metrocampa margaritata, L. Food ; elm, birch, oak, hornbeam, willow, and poplar. Common.

Anagoga pulveraria, L. Food ; willow, hazel, beech, maple, etc.

Antepione depontanata, Gr.

Antepione sulphurata, Pack. Rare.

Angeronia crocataria, Fab. Food ; strawberry, gooseberry, and currant. Common.

Nematocampa filamentaria, Guén. Food ; apple, strawberry, pear, currant, maple, elm, oak, hazel, gooseberry, willow, hickory, walnut, etc. Common.

Plagiodes rosaria, G. & R. Rare.

Plagiodes Keutzingaria, Gr. Food ; apple. Rare.

Plagiodes fervidaria, H.-S. Food ; maple and ash. Rare.

Plagiodes acolaria, Guén. Rare.

Plagiodes phlogosaria, Guén. Food ; wild cherry. Rare.

Geometra iridaria, Guén. Not common.

Hyperetis amicararia, H.-S. Food ; beech, hornbeam, oak, alder, birch, and *Hypericum*.

Aplodes mimosaria, Guén. Food ; oak. Rare.

Aplodes rubrolineararia, Pack. Food ; wax myrtle (*Myrica*). Rare.

Aplodes rubromarginaria, Pack. Food ; wax myrtle (*Myrica*). Rare.

Synchlora rubivora, Riley. Food ; raspberry. Common.

Synchlora rubifrontaria, Pack. Rare.

Nemoria subcroceata, Walk. Not common.

Nemoria gratata, Walk. Rare.

Nemoria pistaciata, Guén. Rare.

Eucrostis chloroleucaria, Guén. The larva living on the flowers of raspberry, blackberry, and *Helenium autumnale*. Common.

- Dyspteris abortivaria**, H.-S. Food; grape. Rare.
- Euphanessa mendica**, Walk. Not common.
- Euphanessa meridiana**, Slosson. Rare. Three specimens taken in Central Park by W. Beutenmüller, Aug. 1889. Hitherto only known from Florida.
- Ephyra pendulinaria**, Guén. Food; sweet fern (*Comptonia asplenifolia*). Common.
- Ephyra myrtaria**, Guén. Food; sweet fern (*Comptonia asplenifolia*) and huckleberry.
- Acidalia insularia**, Guén. Food; *Celastrus scandens*, *Galium*, and *Cassia*.
- Acidalia inductata**, Guén. Common.
- Acidalia quadrilineata**, Pack. Scarce.
- Acidalia cacuminata**, Morr. Scarce.
- Acidalia enucleata**, Guén. Food; huckleberry, *Rheria lutea*, and *Galium*. Common.
- Asthena albogilvaria**, Morr. Food; elm. Not common.
- Calothyranis amaturaria**, Walk. Rare.
- Callopteryx dryopterata**, Gr. Rare.
- Stegania pustularia**, Guén. Food; maple. Common.
- Gueneria basiata**, Walk. Not common.
- Deilinia variolaria**, Guén. Food; willow. Not common.
- Deilinia erythemaria**, Guén.
- Corycia vestaliata**, Guén. Food; apple, hornbeam, and oak. Common.
- Corycia semiclarata**, Walk. Rare.
- Eumacaria brunnearia**, Pack. Food; apple and cherry. Not common.
- Semiothisa præatomata**, Harv. Food; huckleberry. Not common.
- Semiothisa bisignata**, Walk. Food; birch. Scarce.
- Semiothisa multilineata**, Pack. Rare.
- Semiothisa enotata**, Guén. Food; *Lactuca grandifolia*. Common.
- Semiothisa granitata**, Guén. Not common.
- Semiothisa ocellinata**, Guén. Food; locust. Common.
- Phasiane orillata**, Walk. Rare.
- Phasiane nubiculata**, Pack. Rare.
- Thamnonoma wavaria**, L. Food; currant and gooseberry. Not common.
- Thamnonoma subocessaria**, Walk. Food; currant and gooseberry. Not common.
- Thamnonoma sulphuraria**, Pack. Rare.
- Loxogramma latispargata**, Walk. Scarce.
- Loxogramma detersata**, Guén. Scarce.
- Loxogramma defluata**, Walk. Food; grass. Rare.
- Eufitchia ribearia**, Fitch. Food; currant and gooseberry. Common.
- Fidonia notataria**, Walk. Food; tamarack, hemlock, and pine. Scarce.
- Hæmatopsis grataria**, Fabr. Food; *Stellaria media* and *Polygonum*. Common.
- Caterva catenaria**, Dr. Food; blackberry, cranberry, hazel, oak, *Myrica*, wild indigo, *Genista tinctoria*, *Carex pennsylvanica*, and *Rhus toxicodendron*. Common.

Aspilates dissimiliaria, Hüb. Food; *Trifolium*. Scarce.

Aspilates coloraria, Fab. Food; blackberry and raspberry. Not common.

Cleora pulchraria, Minot. Food; tamarack, pine, spruce, fir, and hemlock. Not common.

Hemerophila unitaria, H.-S. Not common. Generally found resting on trunks of trees.

Epimecis hortaria, Fab. Food; tulip-tree. Rare.

Cymatophora umbrosaria, Hüb. Food; horse-chestnut and elm. Common.

Cymatophora polygrammaria, Pack. Scarce.

Cymatophora larvaria, Guén. Food; willow and wild cherry. Common.

Cymatophora pampinaria, Guén. Food; willow, poplar, ash, pear, apple, elm, maple, strawberry, and cranberry. Common.

Cymatophora humaria, Guén. Food; *Rhexia mariana*? Common.

Cymatophora crepuscularia, Fr. Food; plum, apple, pear, elm, maple, and clover. Common.

Tephrosia canadaria, Guén. Food; tamarack, hemlock, pine, spruce, and wax myrtle (*Myrica*). Common.

Tephrosia cognataria, Hüb. Not common.

Tephrosia anticaria, Walk. Not common.

Tephrosia cribrataria, Guén. Food; poplar and willow. Rare.

Paraphia subatomaria, Guén. Food; pine, spruce, poplar, etc. Not common.

Paraphia deplanaria, Guén. Food; beech, alder, basswood, fir, spruce, and pine. Not common.

Biston ursarius, Walk. Food; poplar, elm, wild cherry, etc. Taken at Plainfield, N. J., by Mr. C. Palm. Rare.

Eubyja cognataria, Guén. Food; apple, pear, plum, basswood, maple, elm, birch, poplar, willow, locust, horse-chestnut, gooseberry, currant, etc. Common.

Eubyja cupidaria, Gr. Rare.

Eubyja quernaria, A. & S. Food; oak. Rare.

Hybernia tillaria, Harr. Food; basswood, apple, pear, elm, etc. Rare.

Phigalia strigataria, Minot. Food; rose, birch, maple, and elm. Rare.

Anisopteryx vernata, Harris. Food; apple, pear, cherry, maple, ash, elm, and honey-locust. Not common.

Operophtera boreata, Hüb. Food; apple, pear, maple, and elm. Not common.

Heterophleps Harvelata, Pack. Rare.

Heterophleps triguttaria, H.-S. Food; maple. Common.

Heliomata infulata, Gr. Rare.

Heliomata cyoladata, Gr. Rare.

Baptia albivittata, Guén. Not common.

Lobophora geminata, Gr. Rare.

Lobophora vernata, Pack. Food; Juneberry (*Amelanchier canadensis*). Rare.

Lobophora inequalata, Pack. Rare.

Hydria undulata, L. Food; willow and wild cherry. Common.

Phibalapteryx latirupta, Walk. Food; *Polygonum*. Not common.

- Phibalapteryx intestinata**, Guén. Scarce.
- Antiolea vasaliata**, Guén. Food ; various species of wild roses. Scarce.
- Rheumaptera ruficollata**, Guén. Food ; birch. Not common.
- Rheumaptera intemediata**, Guén. Food ; elm.
- Rheumaptera lacustrata**, Guén. Food ; raspberry and blackberry. Common.
- Rheumaptera hastata**, L. Food ; birch and wax myrtle (*Myrica*). Rare.
- Rheumaptera fluctuata**, L. Food ; cabbage. Not common.
- Rheumaptera unangulata**, Haw. Food ; chickweed. Not common.
- Ochyria ferrugata**, L. Food ; smartweed (*Polygonum*) and *Nepeta hederacea*. Common.
- Ochyria lignicolorata**, Pack. Scarce.
- Ochyria designata**, Hüb. Food ; radish, water-cress, turnip, cabbage, etc. Common.
- Petrophora diversilineata**, Hüb. Food ; grape and Virginia creeper. Common.
- Petrophora testata**, L. Food ; birch, willow, and bean.
- Petrophora atricolorata**, G. & R.
- Petrophora truncata**, Huf. Food ; strawberry. Common.
- Petrophora hersiliata**, Guén. Not common.
- Epirrita perlineata**, Pack. Food ; beech and alder. Not common.
- Plemyria fluviata**, Hüb. Food ; elm, smart-weed (*Polygonum*), and *Senecio*. Common.
- Plemyria multiferrata**, Walk. Food ; smartweed (*Polygonum*). Not common.
- Eupethecia miserulata**, Gr. Food ; *Taxus*, juniper, and tamarack. Not common.
- Eupethecia absynthiata**, L. Food ; golden-rod (*Solidago*), *Senecio*, and *Artemisia*. Not common.

PYRALIDÆ.

- Omphalocera cariosa**, Led. Food ; *Anoma triloba*.
- Aglossa domalis**, Guén. Common.
- Asopia farinalis**, L. Food ; corn. Common.
- Asopia costalis**, Fabr. Food ; clover.
- Asopia olinalis**, Guén.
- Asopia cohortalis**, Gr.
- Asopia himonialis**, Zell.
- Asopia squamealis**, Gr.
- Cordylopeza nigrinodes**, Zell. Not common.
- Arta statalis**, Gr.
- Chalcoela aurifera**, Zell.
- Scoparia centuriella**, S. V. Common.
- Scoparia libella**, Gr. Rare.
- Theloteria pupula**, Hüb. Scarce.
- Botys octomaculata**, L. Common.

- Botys inaequalis**, Guén. Food; thistle.
Botys generosa, G. & R. Food; *Monarda fistulosa*.
Botys borealis, Pack.
Botys rufifimbrialis, Gr.
Botys sumptuosalis, Walk. Common.
Botys rubigalis, Guén. (*Harveyana*, Gr.).
Botys badipennis, Gr. Not common.
Botys flavidalis, Guén.
Botys oxydalis, Guén.
Botys citrina, G. & R. Common.
Botys futilalis, Led. (*erectalis*, Gr.). Food; dogs-bane. Common.
Botys marculenta, G. & R. .
Botys submedialis, Gr.
Botys opillalis, Gr.
Botys pertextalis, Led.
Botys gentilis, Gr.
Botys magistralis, Gr. Food; *Clethra alnifolia*. Common.
Botys quinquelinealis, Gr. Not common.
Botys feudalis, Gr.
Botys terrealis, Tr.
Botys dasconalis, Walk.
Botys oscitalis, Gr. Food; willow and poplar. Not common.
Botys venalis, Gr. Food; locust.
Botys illibalis, Hüb. Rare.
Botys plectilis, G. & R. Not common.
Botys subolivialis, Pack. Not common.
Botys niveicilialis, Gr.
Botys ventralis, G. & R. Common.
Eurycreon rantalis, Guén. Food; *Amaranthus* and *Ambrosia*.
Eurycreon cereralis, Zell.
Eurycreon chortalis, Gr.
Eurycreon perplexalis, Fern.
Nomophila noctuella, S. V. Common.
Mesographa stramentalis, Hüb. Food; horse-radish. Not common.
Crocidophora tuberculalis, Led.
Crocidophora serratissimalis, Zell.
Pantographa limata, G. & R. Food; linden. Not common.
Blepharomastix ranalis, Guén. Common.
Eudiotis hyalinata, L. Larva bores in the stems of squash, pumpkins, etc.
Eudiotis nitidalis, Cr. Food; same as preceding species.
Desmia maculata, West. Food; grape. Rare.
Cindaphia bicoloralis, Guén. Not common.
Conchylodes platinalis, Guén.
Margarodes quadristigmalis, Guén. Not common.
Diathrausta 8-maculalis, Fern.
Oligostigma albalis, Rob. Common.
Oligostigma obscuralis, Gr. Rare.

- Hydrocampa genuinalis**, Led. Not common.
Paraponyx plenilinealis, Gr.
Nymphæella dispar, Gr.
Lipocosma sicalis, Walk.
Homophysa glaphyralis, Guén.
Homophysa albolineata, G. & R.
Homophysa sesquialis, Hüb.
Saluda asperatella, Clem.
Tetralopha baptisiella, Fern. Food; *Baptisia*.
Nephopteryx ovalis, Pack.
Vitula Edmandsii, Pack.
Pinipestis reniculella, Gr.
Acrobasis rubrifasciella, Pack. Food; sweet fern (*Myrica*) and alder.
 Common.
Acrobasis indiginella, Zell. Food; hickory and apple.
Acrobasis Angusella, Gr. Food; hickory.
Acrobasis demotella, Gr.
Acrobasis caryæ, Gr. Food; hickory.
Salebria contatella, Gr. Food; locust.
Salebria celtidella, Hulst. Food; *Celtis*.
Nephopteryx gleditschiella, Fern. Food; *Gleditschia*.
Etiella villosella, Hulst.
Zophodia grossulariæ, Pack. Food; gooseberry.
Lætilia coccidivora, Comst. Rare. Food; *Coccidæ*.
Honora mellinella, Gr. Food; beeswax.
Euzophera semifuneralis, Walk. Food; plum.
Plodia interpunctella, Hüb. Food; dried fruits.
Argyria nivalis, Dr. Not common.
Argyria nummulalis, Hüb. Rare.
Crambus Girardellus, Clem. Not common.
Crambus sericinellus, Zell.
 var. **inornatellus**, Clem.
Crambus Leachellus, Zinck. Common.
Crambus agitatellus, Clem. Common.
 var. **alboclavellus**, Schl. Rare.
Crambus albellus, Clem. Not common.
Crambus bipunctellus, Zell. Not common.
Crambus laqueatellus, Clem. Common.
Crambus topiarius, Zell. Common.
Crambus camurellus, Clem. Not common.
Crambus elegans, Clem. Common.
Crambus exsiccatus, Zell. Not common.
Crambus caliginosellus, Clem.
Crambus duplicatus, Gr. (sellus, Fern.).
Crambus fuscicostellus, Zell. Not common.
Crambus vulgivagellus, Clem. Food; grass, wheat, rye, etc. Common.
Schcenobius longirostellus, Clem. Not common.

TORTRICIDÆ.

- Teras trisignana**, Robs. Not common.
- Teras hastiana**, L. Food; willow.
- Teras oxycoccana**, Pack. Food; cranberry. Common.
- Cacœcia rosaceana**, Harr. Food; apple, cherry, pear, plum, rose, birch, lilac, horse-chestnut, clover, raspberry, blackberry, strawberry, oak, hazel, burdock, thistle, ragweed, poplar, sumach, sunflower, horse-radish, honeysuckle, dogwood, beans, thorn, etc. etc. Common.
- Cacœcia rosana**, L. Food; apple, elm, willow, birch, hazel, linden, currant, rose, raspberry, thorn, etc. Not common.
- Cacœcia purpurana**, Clem. Food; geranium. Not common.
- Cacœcia cerasivorana**, Fitch. Food; cherry, white birch. Common.
- Cacœcia parallela**, Robs. Common.
- Cacœcia argyrospila**, Walk. Food; rose, apple, hickory, oak, elm, cherry, etc. Not common.
- Cacœcia fervidana**, Clem. Food; rose, oak. Common. Myriads of this species appeared on August 1, 1887, flying around the electric lights in the streets of New York City, especially along Third Avenue.
- Cacœcia fractivittana**, Clem. Common.
- Ptycholoma persicana**, Fitch. Food; strawberry, peach.
- Ptycholoma melaleucana**, Walk. Food; *Trillium erectum*, *Polygonatum biflorum*.
- Tortrix pallorana**, Robs. Food; cherry, verbena, etc. Common.
- Tortrix quercifolia**, Fitch. Food; blackberry, oak, etc. Common.
- Tortrix albicomana**, Clem. Food; oak, rose, *Aquilegia canadensis*.
- Amorbia humerosana**, Clem. Food; *Rhus toxicodendron*, spicebush (*Lindera*), and pine.
- Dichella sulfureana**, Clem. Food; verbena, pine, clover, locust, strawberry, grape, willow, etc. Common.
- Genopsis reticulatana**, Clem. Food; rose, geranium, oak, persimmon, pear, maple.
- Capua furcatana**, Walk.
- Conchylis dorsimaculana**, Robs.
- Conchylis angulatana**, Robs.
- Retinia comstockiana**, Fern. Food; pine. Common in Central Park.
- Eudemis botrana**, Schiff. Food; thistle, grape, rose, sassafras.
- Eccopsis permundana**, Clem. Food; huckleberry, strawberry, blackberry, hazel, hickory, etc.
- Eccopsis fasciatana**, Clem.
- Eccopsis inornatana**, Clem. Food; oak.
- Sericoris coruscana**, Clem.
- Sericoris bipartitana**, Clem.
- Pædisca dorsisignatana**, Clem. Food; roots of golden-rod (*Solidago*).
- Pædisca Scudderiana**, Clem. Food; *Solidago*, making gall on stem. Common.

- Pædisca otiosana***, Clem.
Semasia formosana, Clem.
Semasia striatana, Clem.
Steganoptycha fasciolana, Clem.
Rhopobota vacciniana, Pack. Food; cranberry.
Phoxopteris spireæfoliana, Clem. Food; nine-bark (*Spiræa opulifolia*).
 Common.
Phoxopteris platanana, Clem. Food; sycamore.
Carpocapsa pomonella, L. Food; fruit of apple, pear, peach, etc. Common.

TINEIDÆ.

- Choreutis pavonicella***, Clem. Rare.
Choreutis virginella, Clem. Rare.
Acrolophus plumifrontellus, Clem. Common.
Pseudanaphora arcanella, Clem. Common.
Amadrya effrenatella, Clem. Common.
Xylesthia pruniramella, Clem. The larva feeds on the woody excrescences found on the branches of the plum-tree.
Tinea biseliella, Hum. Food; carpets, woolens, furs, etc. Very common.
Tinea pellionella. Food; same as the preceding species. Very common.
Tinea granella, L. Not common. Food; grain, wheat, corn, etc.
Blabophanes crocicapitella, Clem. Common.
Blabophanes dorsistrigella, Clem. Common.
Hyponomeuta multipunctella, Clem. Not common.
Pronuba yuccasella, Riley. Larva feeds in the ovary on the seeds of *Yucca*. Common.
Plutella cruciferarum, Zell. Food; cabbage. Common.
Epigraphia Packardella, Clem. Rare.
Cryptolechia contrariella, Walk. Not common.
Cryptolechia quercicella, Clem. Food; oak, aspen. Not common.
Cryptolechia tentoriferella, Clem. Larva in web on oak, cherry, and walnut. Not common.
Cryptolechia Schlägeri, Zell. Food; wax myrtle (*Myrica*) and oak. Common.
Depressaria curvilineella, Beut. Rare.
Depressaria atrodorsella, Clem. Larva in leaf of beggar-tick (*Bidens*) folded lengthwise. Not common.
Depressaria hilarella, Zell. Larva in leaf of *Sanicula* folded lengthwise, also feeds on locust. Not common.
Depressaria pulvipennella, Clem. Larva in leaf of golden-rod rolled lengthwise. Not common.
Depressaria Lecontella, Clem. Common.
Depressaria heracliiana, DeG. Larva in stems of parsnip and other umbelliferous plants.

- Gelechia agrimoniella**, Clem. Larva on *Agrimonia* rolling the leaves. Not common.
- Gelechia alacella**, Clem. Not common.
- Gelechia flavocostella**, Clem. Not common.
- Gelechia rhoifrutella**, Clem. Larva on poplar in a leaf rolled lengthwise, also in fruit racemes of sumac. Common.
- Gelechia rubidella**, Clem. Not common.
- Gelechia roseosuffusella**, Clem. Not common.
- Gelechia bilobella**, Zell. Not common.
- Gelechia gallæsolidaginis**, Riley. Larva burrows in the stems of golden-rod, making a fusiform swelling. Not common.
- Sitotroga cerealella**, Oliv. Larva in kernels of corn, wheat, etc. Common.
- Strobisia emblemella**, Clem. Scarce.
- Strobisia levipedella**, Clem. Rare.
- Ypsalophus pometellus**, Harr. Larva on apple, folding the leaves. Common.
- Anarsia lineatella**, Zell. Larva in woody excrescences of plum, peach, apple, also in stems of strawberry.
- Dasyocera Newmanella**, Clem. Rare.
- Ecophora argenticinctella**, Clem. Common.
- Butalis impositella**, Zell. Larva in web on underside of leaf of asters. Common.
- Butalis basilaris**, Zell. Common.
- Blastobasis glandulella**, Riley. Larva in acorns. Common.
- Argyresthia andereggiella**, Dup. Larva and food not known in this country; lives in the buds of hazel and apple in Europe. Common.
- Gracillaria sassafrasella**, Cham. Larva on sassafras in leaf rolled downward. Common.
- Coleophora malivorella**, Riley. Larva in pistol-shaped case on apple and wild cherry. Common.
- Cosmopteryx gemmiferella**, Clem. Rare.
- Antispila cornifoliella**, Clem. Larva in a blotch-mine on dogwood. Not common.
- Antispila nysæefoliella**, Clem. Larva mines the leaves of sour gum (*Nyssa*). Common.
- Aspidisca splendoriferella**, Clem. Larva mines the leaves of thorn, apple, etc. Common.
- Tischeria citrinipennella**, Clem. Larva mines and rolls the leaves of pin-oak. Common.
- Lithocolletes hamadryadella**, Clem. Larva mines the leaves of white oak. Common.
- Lithocolletes Fitchella**, Clem. Larva mines on the underside of leaves of oak. Common.
- Lithocolletes robiniella**, Clem. Larva mines the leaves of locust. Common.

Lithocolletes caryæfoliella, Clem. Larva mines the leaves of hickory and walnut. Common.

Lithocolletes tubiferella, Clem. Larva mines the leaves of white oak.

Lithocolletes guttifinitella, Cham. Larva mines the leaves of poison-ivy (*R. toxicodendron*). Common.

Lithocolletes desmodiella, Clem. Larva mines the leaves of *Desmodium*.

Bucculatrix pomifoliella, Clem. Food ; apple.

PTEROPHORIDÆ.

Plapyptilus ochreodactylus, var. **Bischoffi**, Z.

Oxyptilus nigriciliatus, Zell. Food ; spruce. Rare.

Oxyptilus periscelidactylus, Fitch. Food ; grape. Common.

Pterophorus monodactylus, L.

Lioptilus fuscopuntatus, Fish.

SUMMARY.

	No.
<i>Papilionide</i>	97
<i>Sphingide</i>	39
<i>Egeride</i>	16
<i>Thyridæ</i>	3
<i>Zygenide</i>	9
<i>Bombycide</i>	130
<i>Noctuide</i>	384
<i>Geometridæ</i>	145
<i>Pyalide</i>	108
<i>Tortricide</i>	39
<i>Tineide</i>	59
<i>Pterophoridae</i>	5
Total	<hr/> 1034

IV.—*A Review of the American Species of Thread-fins* (*Polynemidæ*).

BY PHILIP H. KIRSCH.

Read October 14, 1889.

In this paper I have given the synonymy of the Thread-fins or *Polynemidæ* known to inhabit American waters, and an analytic key by which the species may be distinguished. All the specimens examined by me belong to the Museum of the University of Indiana. Most of them were collected by Dr. Jordan and his assistants.

INDIANA UNIVERSITY, July 8, 1889.

CHARACTERS OF THE POLYNEMIDÆ.

Body oblong, compressed and covered with rather large, loosely inserted, ctenoid scales. Lateral line continuous, continued on the tail, usually forked with a branch on each lobe. Head entirely scaly; snout more or less conical, projecting over the mouth, which is rather large, inferior, with lateral cleft; premaxillary protractile, its spine vertical; maxillary without supplemental bone, extending much beyond the eye, which is anterior, lateral, rather large, with adipose eyelid. Villiform teeth on jaws, palatines, and sometimes on vomer. Pseudobranchiæ concealed. Branchiostegals 7. Gill-membranes separate and free from the isthmus. Gills 4, a slit behind the fourth. Two separate dorsals, somewhat remote from each other, the first of 8 feeble but rather high spines, the first and last spines very short, the third longest; the second dorsal equal to first in height but base somewhat longer, of soft rays only. Anal fin either similar or much longer than soft dorsal; caudal fin rather long, widely forked. Second dorsal, anal, and caudal fins more or less covered with small scales; the first three or four dorsal spines winged. Ventrals I, 5, abdominal, but not far removed from pectorals; pectoral fins moderate, placed low, in two parts, the lower

and anterior portion of several filiform articulated appendages, free from each other, said to be organs of touch. In the young, the dorsal, caudal, and pectoral fins are dusky, the anal and ventral fins white; all the fins grow darker with age, the pectorals usually becoming black, the operculum blackish. Bones of the skull with a well-developed muciferous system as in *Sciænidae*. "Basis cranii double, with tube; post-temporal bifurcate; scapula with median foramen; superior pharyngeal bones 4. Brachial ossicles divided; two normal, supporting the dorsal fin, one longitudinal without rays, and one a plate on the coracoid, supporting the pectoral filaments." (Cope.) Stomach cæcal, with a few pyloric appendages. Air-bladder various, sometimes wanting. Vertebræ 24. Genera 4, *Galeoides*, *Polistonemus*, *Polynemus*, and *Polydactylus*, the last two only are found in America; species about 25, of which 5 are found in America. Inhabit tropical seas, and entering rivers. Most of them are valued as food fishes.

This peculiar family constitutes the group or suborder *Rhegnopteri*, characterized chiefly by the peculiarities of structure and attachment of the pectoral fin. Its relations appear to be with the *Sciænidae* on the one hand and with the *Mugilidae* on the other, but these resemblances may be superficial.

ANALYSIS OF AMERICAN GENERA OF POLYNEMIDÆ.

- a. Anal fin much longer than soft dorsal, of about 30 rays; vomer without teeth; preoperculum entire; free filaments of pectorals longer than body.

Polynemus, 1.

- aa. Anal fin not much longer than soft dorsal, of about 13 or 14 rays; vomer with teeth; preoperculum serrate; free filaments of pectorals mostly shorter than body.....**Polydactylus, 2.**

Genus I. **POLYNEMUS.**

Polynemus Gronow, Mus. Ichthyol. 31, 1754 (*quinquarius*).

Pentanemus Artedi, Sebæ Thesaurus, III, 74, 1758 (*quinquarius*).

Polynemus Linnæus, Syst. Nat., Ed. X, 317, 1758 (in part; *quinquarius*; *virginicus*; *paradisæus*).

Pentanemus Günther (*quinquarius*).

Polynemus Gill, Proc. Acad. Nat. Sci. Phila., 272, 1861 (*quinquarius*).

Type. *Polynemus quinquarius* Linnæus.

Etymology. πολῦς, many; νῆμα, thread.

ANALYSIS OF SPECIES OF **POLYNEMUS**.

a. Pectoral filaments 5:

D. VIII—I, 15; A. III, 30; Scales 6—73—17.....**quinquarius**, 1.

1. Polynemus quinquarius.

Polynemus Gronow, Mus. Ichthyol., 31, 1754 (Mus. Sebæ).

Pentanemus Artedi, "Sebæ Thesaurus, III, 74, 1758" (Mus. Sebæ).

Polynemus quinquarius Linnæus, Syst. Nat., Ed. X, 317, 1758 (America, after Gronow); Linnæus, Syst. Nat., I, 521, 1766; and of the copyists; Gronow, Syst. Ed. Gray, 176, 1854 (Oceano America).

Pentanemus quinquarius Günther, Cat. Fish. Brit. Mus., II, 331, 1860 (Ashantee; river Niger; Cuba).

Polynemus artedii Bennett, Proc. Zool. Soc., 146, 1831 (Africa).

Polynemus macronemus Pel, "Bydrage tot de Dierk. 9, 1851" (Africa).

Habitat. Atlantic Ocean; West Indies to coast of Africa.

Etymology. Lat. *quinque*, five.

This species is known to me only through description.

Genus II. **POLYDACTYLUS**.

Trichidion Klein, Historia Piscium, Missus. V, 28, 1749 (*Præcoaba* Margrave = *virginicus*), (non-binomial).

Polynemus Linnæus, Syst. Nat., Ed. X, 317, 1858 (in part, *quinquarius*; *virginicus*; *paradisæus*).

Polydactylus Lacépède, Hist. Nat. Poiss., VIII, 181, 1832 (*plumieri* = *virginicus*).

Polynemus Günther, Cat. Fish. Brit. Mus., 319, 1860 (*paradisæus*).

Trichidion Gill, Proc. Acad. Nat. Sci. Phila., 274, 1861 (*plumieri* = *virginicus*).

Type. *Polydactylus plumieri* Lacépède = *Polynemus virginicus* Linnæus.

Etymology. *πολύς*, many; *δάκτυλος*, finger.

ANALYSIS OF SPECIES OF POLYDACTYLUS.

a. Pectoral filaments 6 (rarely 5):

Body rather deep, compressed, the back elevated, anterior profile from snout to spinous dorsal slightly convex; maxillary $2\frac{1}{2}$ in head; snout 7 in head; eye large, less than interorbital space, 5 in head. Scales rather large. Longest dorsal spine $1\frac{1}{2}$ in head; caudal lobes somewhat longer than head; pectoral fin $1\frac{1}{2}$ in head; pectoral filaments longer than head, reaching to front of anal fin in adult. Color yellowish-white, darker above; pectorals black in adult. Head $3\frac{1}{2}$ in length; depth 3; D. VIII—I, 12; A. III, 13 or 14; Scales 6—62—10.....**approximans**, 2.

aa. Pectoral filaments 7:

Body deep, compressed, anterior profile nearly straight; maxillary $2\frac{1}{4}$ in head; length of snout 5 in head; eye large, equal to interorbital space, 5 in head. Scales moderate. Longest dorsal spine equal to longest ray of soft dorsal and $1\frac{1}{2}$ in head; caudal lobes about as long as head; pectoral fin $1\frac{1}{2}$ in head; pectoral filaments somewhat longer than head, reaching to front of anal fin, in adult. Color yellowish-white, darker above; scales on back with dark punctulations on their margins; the young silvery-white. Head $3\frac{1}{2}$ in length; depth $3\frac{1}{2}$; D. VIII—I, 9 to 12; A. III, 13 or 14; Scales 7—71—10 **virginicus**, 3.

aaa. Pectoral filaments 8 or 9.

- b.* Maxillary less than $\frac{1}{2}$ length of head; pectoral filaments 8; body somewhat compressed, elongated, anterior profile nearly straight, little declined. Head much compressed, gape oblique; snout 5 in head; eye less than interorbital space, $4\frac{1}{2}$ in head. Scales rather small. Longest dorsal spine $1\frac{1}{4}$ in head; longest ray of soft dorsal $1\frac{3}{8}$ in head; caudal lobe slightly longer than head, $3\frac{1}{4}$ in body; pectoral fins $1\frac{1}{2}$ in head; pectoral filaments reaching to vent in adult (*octofilis*), longer in young (*octonemus*). Color light olivaceous, tinged with dark punctulations; belly whitish; pectoral black in adult, pale in young. Head $3\frac{1}{2}$ in length; depth $3\frac{3}{4}$; D. VIII—I, 12 or 13; A. III, 13 to 15; Scales 6—70—10.

octonemus, 4.

- bb.* Maxillary more than $\frac{1}{2}$ length of head; pectoral filaments usually 9; body elongate, compressed, outline from spinous dorsal to snout slightly convex, and little declined. Head much longer than high; snout conical, 7 in head; eye rather large, about 5 in head. Scales of small size. Longest dorsal spine $1\frac{3}{8}$ in head; longest ray of soft dorsal $1\frac{3}{4}$ in head; caudal lobes slightly longer than head; pectoral fin as long as head behind pupil; pectoral filaments reaching near front of anal fin in adult. Color greenish-brown above and yellowish-green below. Head $3\frac{1}{2}$ in length; depth $3\frac{3}{8}$; D. VIII—I, 12; A. III, 13; Scales 8—69 or 75—13.

opercularis, 5.**2. Polydactylus approximans.**

- Polynemus approximans* Lay & Bennett, Beechey's Voyage, Zool. Fish., 57, 1849 (Mazatlan); Günther, Fish. Centr. Amer., 423, 1869 (Chiapam; Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 365, 376, 1882 (Panama); Jordan & Gilbert, Bull. U. S. Fish. Com., 107, 111, 112, 1882 (Mazatlan; Panama; Puntas Arenas); Steindachner, Ichthyologische Beiträge, IV, 8, 1875 (copied); Jordan, Proc. U. S. Nat. Mus., 372, 1885 (Mazatlan; Panama); Jordan, Cat. Fish. N. Amer., 66, 1885; Jenkins & Evermann, Proc. U. S. Nat. Mus., 1888 (Guaymas).
Trichidion approximans Gill, Proc. Acad. Nat. Sci. Phila., 258, 1862 (Cape San Lucas); 169, 1863 (Panama).

Polynemus californiensis Alexandre Thominot, Bulletin de la Société Philomathique de Paris, Séance du 27 Juin, 1886 (California).

Habitat. Pacific coast of Tropical America, from Guaymas to Panama.

Etymology. Latin, *approximans*, approaching.

This species is a common food fish of the Pacific coast of Mexico. The specimens examined by me are 11 inches in length, taken by Jenkins & Evermann at Guaymas.

3. *Polydactylus virginicus*.

Piracoaba Margrave, Hist. Nat. Brazil, 176, 1648 (Brazil).

Polynemus virginicus Linnæus, Syst. Nat., Ed. X, 317, 1758 (America); Linnæus, Syst. Nat., 521, 1766, and of copyists; Jordan, Proc. U. S. Nat. Mus., 118, 1884 (Key West); Jordan, Proc. U. S. Nat. Mus., 36, 1886 (Havana).

Polynemus paradiseus Bloch, Ichthyologia, XII, 28, taf. 402, 1793; Bloch & Schneider, Syst. Ichthyologia, 18, 1801 (not of Linnæus).

Polydactylus plumierii Lacépède, Hist. Nat. Poiss., V, 419, 1803 (Martinique, from a drawing by Plumier).

Polynemus plumierii Günther, Cat. Fish. Brit. Mus., II, 321, 1860 (San Domingo); Jordan & Gilbert, Synop. Fish. North America, 413, 1883.

Trichidion plumieri Gill, Proc. Acad. Nat. Sci. Phila., 279, 1861 (Caribbean Sea); Poey, Synopsis Piscum Cubensium, 387, 1868 (Havana); Poey, Enumeratio Piscum Cubensium, 334, 1875 (Porto Rico).

Polynemus mango Lacépède, Hist. des Poiss., V, 413, 417, 418, 1803 (based on *P. virginicus* Linnæus).

Polynemus americanus Cuv. & Val., III, 393, 1829.

Polynemus oligodon Günther, Cat. Fish. Brit. Mus., II, 322, 1860 (Rio Janeiro; Jamaica).

Habitat. West Indian fauna, north to the Florida Keys.

Etymology. Latin, from *virginia*.

The specimens examined by me were taken by Dr. Jordan, two at Key West $1\frac{1}{2}$ inches in length, and six at Havana $4\frac{1}{2}$ inches in length.

4. *Polydactylus octonemus*.

Polynemus octonemus Girard, Proc. Acad. Nat. Sci. Phila., 167, 1858 (Brazos Santiago; Galveston); Günther, Cat. Fish. Brit. Mus., II, 320, 1860 (copied); Goode & Bean, Proc. U. S. Nat. Mus. 128, 1879 (Pensacola, Fla.); Jordan & Gilbert, Synop. Fish. North America, 413, 1883.

Trichidion octonemus Gill, Proc. Acad. Nat. Sci. Phila., 280, 1861.

Trichidion octofilis Gill, Proc. Acad. Nat. Sci. Phila., 280, 1861 (New York).

Polynemus octofilis Jordan & Gilbert, Proc. U. S. Nat. Mus., 590, 1882 (Charleston, S. C.); Jordan & Gilbert, Synop. Fish. North America, 413, 1883.

Habitat. South Atlantic and Gulf coast of North America.

Etymology. ὀκτώ, eight, νῆμα, thread.

Following the suggestion of Dr. Jordan, I have regarded *Polynemus octofilis* Gill as the adult form of *Polydactylus octonemus*, from which it differs only in having darker pectoral fins and shorter pectoral filaments, differences which occur in other species of *Polydactylus* with age and no doubt in this one also.

The specimens examined by me were taken by Dr. Gilbert at Charleston, S. C., where it is very rare, entirely unknown to the fishermen.

5. *Polydactylus opercularis*.

Trichidion opercularis Gill, Proc. Acad. Nat. Sci. Phila., 168, 1863 (Cape San Lucas).

Polynemus opercularis Günther, Proc. Zool. Soc., 148, 1864 (copied); Günther, Fish. Centr. Amer., 424, 1869 (copied); Steindachner, Ichthyologische Beiträge, IV, 9, 1875 (copied); Jordan & Gilbert, Bull. U. S. Fish. Com., 107, 111, 1882 (Mazatlan; Panama); Jordan, Proc. U. S. Nat. Mus., 372, 1885 (Mazatlan; Panama); Jordan, Cat. Fish. North America, 66, 1885.

Polynemus melanopoma Günther, Fish. Centr. Amer., 421, 1869 (San José).

Habitat. Pacific coast of Tropical America.

Etymology. Latin, *opercularis*, from its dusky blotch on the operculum, found also in most other species.

This species is known to me from specimens dredged by the "Albatross" in the ocean south of Panama.

RECAPITULATION.

The following is the list of the genera and species of the family of Thread-fins (*Polynemidae*) recognized in this paper as occurring in American waters:—

1. *Polynemus* (Gronow) Linnæus.

1. *Polynemus quinquarius* Linnæus.

2. *Polydactylus* Lacépède.

2. *Polydactylus approximans* (Lay & Bennett).
3. *Polydactylus virginicus* (Linnæus).
4. *Polydactylus octonemus* (Girard).
5. *Polydactylus opercularis* (Gill).

V.—*A List of State and Local Floras of the United States
and British America.*

BY N. L. BRITTON.

Read Feb. 24, 1890.

In the *Bulletin of the Torrey Botanical Club*, vols. viii, *et seq.*, there are published "Contributions towards a List of the State and Local Floras of the United States," by Mr. W. R. Gerard and myself. The present paper is an attempt to bring this up to date and supply the numerous omissions of the former work, with the addition of lists published for the Canadian Territory. In this I have been greatly aided by botanists all over the country, and it is believed that the present enumeration contains most of the local floras. No attempt has been made to incorporate all the notes and short lists of local observations, but it has been found difficult to draw the line in many cases. As in the former contribution lists of species without exact localities have been indicated by (A); those giving stations by (B); those giving stations with notes or occasional descriptions by (C); and descriptive floras by (D).

I cannot hope to have covered all the literature of this subject, and will be grateful for further notes and memoranda in the view of preparing a supplementary list. The present is brought down to May, 1890.

I. THE EASTERN STATES.

- 1.—AN ACCOUNT OF SOME OF THE VEGETABLE PRODUCTIONS GROWING IN THIS PART OF AMERICA, BOTANICALLY ARRANGED. By Rev. M. Cutler. (D.)
Mem. Amer. Acad. Arts & Sci., i, 396-493. Boston, 1785.
 - 2.—ENUMERATION OF SOME NEW ENGLAND LICHENS. By Edward Tuckerman. (D.)
Bost. Jour. Nat. Hist., ii, 245-262; iii, 281-306; 438-464; and v, 93-104. 1838-1847.
 - 3.—NOTICE OF SOME RARE PLANTS OF NEW ENGLAND, WITH DESCRIPTIONS OF SOME NEW SPECIES. By Wm. Oakes. (C.)
Hovey's Mag. Horticult., vii, 178-186. Reprinted, 8vo. pamph. pp. 8. Boston, 1841.
- ANNALS N. Y. ACAD. SCI., V, April, 1890.

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- 4.—NOTICE OF SOME OF THE PLANTS OF NEW ENGLAND. By Wm. Oakes. (B.)
Hovey's Mag. Horticult., xiii, 217-220. Boston, 1847.
- 5.—CONTRIBUTIONS TO NEW ENGLAND MYCOLOGY. By Chas. J. Sprague. (B.)
Proc. Bost. Soc. Nat. Hist., v, 325-331, and vi, 315-321. 1856 and 1858.
- 6.—ON THE SHORE ZONES AND LIMITS OF MARINE PLANTS ON THE NORTH-
EASTERN COAST OF THE UNITED STATES. By Alex. F. Kemp. (C.)
Can. Nat. and Geol., vii, 20-34. 1862.
- 7.—FURTHER ENUMERATION OF NEW ENGLAND FUNGI. By Chas. C. Frost. (A.)
Proc. Bost. Soc. Nat. Hist., xii, 77-81. 1868.
- 8.—LIST OF THE SEAWEEDS OR MARINE ALGÆ OF THE SOUTH COAST OF NEW
ENGLAND. By W. G. Farlow, M.D. (B.)
Reps. U. S. Fish Commission. Washington, 1871 and 1872.
- 9.—CATALOGUE OF THE BOLETI OF NEW ENGLAND WITH DESCRIPTIONS OF NEW
SPECIES. By C. C. Frost. (D.)
Bull. Buffalo Soc. Nat. Sci., ii, pp. 100-105. 1874.
- 10.—MARINE ALGÆ OF NEW ENGLAND AND ADJACENT COAST. By W. G. Far-
low, M.D. (D.)
Rep. U. S. Fish Commission for 1879, pp. 1-210; 15 plates. Reprinted,
pp. 210, pl. 15. Washington, 1881.
- 11.—GUIDE TO THE PRINCIPAL ORDERS OF CRYPTOGAMS AND THE COMMONER
AND MORE EASILY DISTINGUISHED NEW ENGLAND GENERA. By Frederick
LeRoy Sargent. (D.)
12mo., pp. 38. Cambridge, 1886.

MAINE.

- 12.—BOTANICAL REPORT ON PLANTS NOT AS YET CREDITED TO MAINE. By
George L. Goodale. (B.)
6th Ann. Rep. Sec. Board Agric., 125-129. 1861.
- 13.—A CATALOGUE OF THE FLOWERING PLANTS OF MAINE. (Includes vascular
Cryptogams.) By George L. Goodale. (B.)
Proc. Portland Soc. Nat. Hist., i, 37-63; 127-138. Portland, 1862.
- 14.—DECADES OF MAINE FUNGI. By M. C. Cooke. (D.)
Proc. Portland Soc. Nat. Hist., i, 179-185. Portland, 1862.
- 15.—LIST OF PLANTS NOTICED IN THE MAINE WOODS IN THE YEARS 1853 AND
1857. By H. D. Thoreau. (B.)
Appendix to "Maine Woods." Boston, 1866.
- 16.—THE PORTLAND CATALOGUE OF MAINE PLANTS. (A.)
Pub. by Port. Soc. Nat. Hist. 8vo. pamph. pp. 12. Portland, 1868.
- 17.—WEEDS OF MAINE. By F. L. Scribner. (D.)
14th Ann. Rep. Sec. State Board Agric., 239-288. 1869.
- 18.—*LIST OF MARINE ALGÆ COLLECTED NEAR EASTPORT, ME., IN AUGUST AND
SEPTEMBER, 1872, IN CONNECTION WITH THE WORK OF THE U. S. FISH
COMMISSION UNDER PROF. S. F. BAIRD. By Daniel C. Eaton. (B.)
Trans. Conn. Acad. Sci., ii, 343-350. New Haven, 1873.
- 19.—ORNAMENTAL AND USEFUL PLANTS OF MAINE. By F. Lamson Scribner. (D.)
19th Ann. Rep. Sec. Maine Board Agric., 157-237. 1874.

- 20.—LIST OF PLANTS FOUND IN MAINE SINCE PUBLICATION OF PORTLAND CATALOGUE. By Frank A. Mansfield. (B.)
"Home and Farm." Augusta, 1881.
- 21.—GRASSES OF MAINE. By C. H. Fernald. (D.)
Pamph., 8vo., pp. 63; 42 plates. 1885.
- 22.—DESMIDS OF MAINE. By Wm. West. (A.)
Journ. Bot., xxvi, 339, 340. 1888.
- 23.—THE FRESH-WATER ALGÆ OF MAINE. By F. L. Harvey. (C.)
Bull. Torr. Bot. Club, xv, 155-161 (1888); xvi, 181-188 (1889).

Hancock County.

- 24.—A LIST OF WEEDS OF HANCOCK COUNTY. By Samuel Wasson. (D.)
Ann. Rep. Sec. State Board Agric., 1878, 236-238.

NEW HAMPSHIRE.

- 25.—CATALOGUE OF THE PLANTS OF NEW HAMPSHIRE. By Wm. F. Flint. (A.)
Geol. N. Hamp., i, 395-415; 651, 652. Concord, 1874.
Amer. Month. Mag. & Critical Review, i, 441. 1817.
- 26.—NEW HAMPSHIRE GRASSES. By Wm. F. Flint. (C.)
New Hampshire Agricultural Rep., 1879, 281-307.
- 27.—A PRELIMINARY CATALOGUE OF THE FLOWERING PLANTS AND HIGHER CRYPTOGAMS, GROWING WITHOUT CULTIVATION WITHIN THIRTY MILES OF HANOVER, N. H., TO WHICH IS APPENDED A LIST OF THE VERTEBRATES OF THE SAME REGION. By Henry G. Jesup. (B.)
Pamphlet, 8vo. pp. 74. Hanover, 1882.
- 28.—THE TREES AND SHRUBS COMPOSING THE NEW HAMPSHIRE FOREST. By Wm. F. Flint. (C.)
Rep. Forestry Comm. N. H., 1885, 30-71.

Carroll County.

- 29.—SOME CRYPTOGAMOUS PLANTS GATHERED IN THE VICINITY OF KEARSARGE MT., N. H. By J. L. Russell. (B.)
Hovey's Mag. Hortie. Bot., etc., ix, 140, 141. 1843.

Coos County.

- 30.—FLORULA OF THE WHITE MOUNTAINS OF NEW HAMPSHIRE. By C. S. Rafinesque, after Jacob Bigelow in N. E. Journ. Med. & Surg., Oct. 1816. (A.)
- 31.—NOTICE OF SOME OF THE MOSSES OF NEW ENGLAND. By William Oakes. Hovey's Mag. Horticulture, Botany, etc., xiii, 171-174. 1847. (These are from the White Mts. chiefly, and include Musci and Jungermanniaceæ.)
- 32.—LIST OF THE PLANTS FOUND IN NEW HAMPSHIRE ONLY ON ALPINE SUMMITS. By C. H. Hitchcock. (A.)
Geol. N. H., i, 571, 572. 1874.
- 33.—CANADIAN PLANTS NATURALIZED ON MT. WASHINGTON. By C. H. Hitchcock. (A.)
Loc. cit., 572, 573. 1874.

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- 34.—LIST OF PLANTS COLLECTED BY E. W. SOUTHWICK ON THE WHITE MOUNTAINS OF NEW HAMPSHIRE, JULY 15, 1841, WITH NOTES AND REFERENCES. By J. Barratt, M.D. (B.)
From the "Classic." 8vo. pamph. pp. 11.
- 35.—CATALOGUE OF THE ALPINE AND SUB-ALPINE FLORA OF THE WHITE MOUNTAINS OF N. H. By Prof. J. W. Chickering. (A.)
Field and Forest, ii, 98, 99. Washington, 1876.
- 36.—NOTES ON THE CRYPTOGAMIC FLORA OF THE WHITE MOUNTAINS. By W. G. Farlow. (D.)
Appalachia, iii, 232-251. 1884.
- (Mr. John Robinson informs me that in the Library of the Massachusetts Horticultural Society there is a pamphlet on White Mountain Plants, by J. H. Huntington, enumerating some 60 species, "read January 10, 1887." I have not been able to ascertain its place of publication.)

VERMONT.

- 37.—CATALOGUE OF VERMONT PLANTS. By Wm. Oakes. (B.)
Thompson's Nat. Hist. Vt., 173-208. Burlington, 1842. Also pamph. 8vo. pp. 36.
- 38.—APPENDIX TO OAKES' CATALOGUE OF VERMONT PLANTS. By Joseph Torrey. Ibidem. Ed. 1853.
- 39.—CATALOGUE OF CRYPTOGAMOUS OR FLOWERLESS PLANTS OF VERMONT. By Chas. C. Frost. (B.)
Archives of Sci. and Trans. Orleans Co. Soc. Nat. Hist., i, 78-81; 111-117; 152, 153; 192-195; 234-240; 249-52. 1871.
- 40.—CATALOGUE OF VERMONT PLANTS: PHÆNOGAMS. By Geo. H. Perkins. (B.)
Archives of Sci. and Trans. Orleans Co. Soc. Nat. Hist., i, 161-166; 181-190; 215-218; 231-234; 252, 253. 1871.
- 41.—A GENERAL CATALOGUE OF THE FLORA OF VERMONT. By George H. Perkins, Ph.D. (B.)
Pamph., 8vo. pp. 49. Montpelier, 1882. Also in Vermont Agricultural Report for 1882, 93-139.
- 42.—CATALOGUE OF THE PLANTS OF MIDDLEBURY. By Edwin James. Hall's Statist. Acc't of Town of Middlebury, 1821.
- 43.—CATALOGUE OF THE FLORA OF VERMONT, INCLUDING PHÆNOGAMOUS AND VASCULAR CRYPTOGAMOUS PLANTS GROWING WITHOUT CULTIVATION. By Geo. H. Perkins, Ph.D. (B.)
10th Rep. State Board of Agriculture, 231-302. Also Pamph., 8vo. pp. 74. Burlington, 1888.

MASSACHUSETTS.

- 44.—CATALOGUE OF THE PLANTS GROWING WITHOUT CULTIVATION IN THE VICINITY OF AMHERST COLLEGE. By Edward Hitchcock. (B.)
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- 45.—CATALOGUE OF THE PLANTS GROWING WITHOUT CULTIVATION IN THE STATE OF MASSACHUSETTS. By Edward Hitchcock. (B.)
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ADDENDA.

No. 21. The real title is :

THE NEW PLANTS OF MAINE. A LIST SUPPLEMENTARY TO THE PORTLAND
CATALOGUE.

"Home and Farm," October 22, 1881, 2d page.

No. 429. The place of publication is :

The Crawford Avalanche, July, 1882.

VI.—*The Crinoidea of the Lower Niagara Limestone at
Lockport, N. Y., with New Species.*

BY EUGENE N. S. RINGUEBERG.

Read April 14, 1890.

That the lower portion of the Niagara Limestone represents a period favorable to the existence of great multitudes of the echinodermata, the profusion of their fragmentary remains gives abundant proof; especially during the time indicated by the band known as the Lockport Encrinal Marble, which is almost entirely made up in places of disconnected plates, columns, and other portions of their calcareous skeletons.

But conditions conducive to their preservation entire were not present; the deposit being too gradual, giving time for the decay of the organic connective portions, with the subsequent separation of the more indestructible parts; so that while many species, and quite a number of genera are known to have flourished, by the remaining evidence of their plates, but few present enough material to base species upon.

Among the genera may be noted *Caryocrinus*, *Gomphocystites*, *Heterocystites*, *Glyptaster*, *Ichthyocrinus*, *Calceocrinus*, *Periechocrinus*, *Lyriocrinus*, *Dimerocrinus*, *Lecanocrinus*, *Catillocrinus*, *Eucalyptocrinus*, *Macrostylocrinus*, and some others, the last four of which are known to be represented by two or more species, but few of these, after years of careful search, have yielded enough connected evidence to prove identity or to warrant description.

In many instances in which the calyx or the entire individual remains intact, the fossil has so nearly the same consistence as the matrix, and the union between the two is so intimate, that it is almost an impossibility to separate or clean them satisfactorily, and only in a small portion of the layers are the components favorable to successful weathering.

While not enough is presented in most cases for specific determi-

nation, enough can be made out to show that the larger proportion are specifically distinct from those found in the underlying shales.

Among the species determined are *Caryocrinus ornatus*, Say; *Eucalyptocrinus inconspicuous*, Ringueberg; *Heterocystites armatus*, Hall; *Lecanocrinus macropetalus*, Hall; *Periechocrinus speciosus*, Hall; *Dimerocrinus immaturus*, Hall; *Calceocrinus contractus*, Ringueberg; and the five new species described below.

Callicrinus acanthinus n. sp. Pl. III, fig. 1.—Calyx sub-angulate, low, ornamented with spines, nodes, and radiating ridges. Ten of the spines are long and slender and spring in a circle from the middle of the calyx, being directed outwards and upwards, their apices reaching to a point about as high as the top of the calyx. Base nearly as broad as the rest of the calyx; deeply excavated by a wide pentagonal depression, which slopes upwards and inwards from the narrow rim of the excavation to about one-third of the height of the sides, its angles are directed radially and present at about the middle of the first radials. Basal plates small, and of the usual form. First radials bent abruptly outwards and upwards near the middle; their outer upper sides being curved inwards so as to conform to the pentagonal base and meet the margins of the adjoining first radials without the formation of an angle at the sutures; they have six ridges, usually strong, radiating from their center, a median one directed inwards towards the columnar facet, lying in the angle of the basal excavation; two laterally and slightly inwards meeting the corresponding ones from the opposite plates and forming the rim of the base, they also represent the point of the upward curvature of the plates; the next two are directed outwards and upwards towards the sides upon which rest the large inter-radial plates, these are the least prominent of any at the point of radiation, but become rapidly more prominent and strong at the margin of the plate; the remaining ridge is projected outwards on a plane with the base, as far as, and on a line with, the sides of the calyx where it is abruptly truncated by a rectangular turn upwards, thus forming a subacute node or spine. The second radial is broader than high and has a strong median ridge extending from one lateral margin to the other. Third radial gradually elevated from the lower and outer sides forming the sloping base of one of the long spines which it bears, and at times has slight ridges meeting those from the adjoining large inter-radials which are similarly elevated and spiniferous. The apices of the plates, and consequently the bases of the spines being on the same plane, in the third radials and the large inter-radials. The spines of the third radials are flattened antero-posteriorly and those of the inter-radials laterally. The rest of the plates forming the calyx all have their ventral portion elevated into nodes or ridges and are of moderate size. Inter-maxillary plates, arms, column, etc., unknown.

This remarkable crinoid has been known to me for quite a number of years past from disconnected plates, but it was not till somewhat over a year ago that a specimen was found which preserved a

little over half of the calyx. I was at first inclined to publish it as a *Eucalyptocrinus*, but upon mentioning it to Chas. Wachsmuth, Esq., of Burlington, Iowa, to whom a diagram of the species was sent, he called my attention to its being a *Callicrinus*. I quote from a letter of his to myself, dated March 21, 1888.

"The specimen of which you send the diagram is in my opinion a *Callicrinus* (Angelin) and not *Eucalyptocrinus*. The genus *Callicrinus* has not heretofore been recognized from America, but I judge from some excellent specimens which I examined lately from Wisconsin, that not only your new species but also Hall's *Eucalyptocrinus cornutus* should be referred to it, and probably Roemer's *Eucalyptocrinus ramifer*."

From the Lower Limestone of the Niagara Group, Lockport, N. Y.

NOTE.—All the plates and their relative proportions as figured in the restoration can be observed in the type specimen, which shows the interior of the calyx and a small portion of the exterior, with four nearly perfect spines.

I also wish to express my indebtedness to Chas. R. Keyes, Esq., who at the request of Mr. Wachsmuth sent me a tracing of *C. murchisonianus*, from *Iconographia Crinoideorum in stratis Succie siluricus fossilium*, page 15, Tab. xxviii, fig. 14, which will be found reproduced on the same plate (Pl. III, fig. 2) with *C. acanthinus* for comparison, and on account of its being of interest in exhibiting parts of the calyx not shown by the specimen from the Niagara, as this is the first publication to my knowledge of this genus here, although as before stated the credit of the generic identification is due to Mr. Wachsmuth.

Dendrocrinus? nodibrachiatus n. sp. Pl. III, fig. 6.—Calyx small, campanulate; sides incurved, evenly tapering to base, which is of the same size as the upper end of the column; rim spreading. Ventral tube long and in its (apparently) compressed condition, about one-half as wide as the diameter of the top of the calyx. Arms ten, long, not tapering till near the end, with nodose joints; pinnulate? Column round, composed of unequally arranged joints, having wide and narrow median rims. Under basals five, as wide as high, pentagonal. Basals hexagonal, with the exception of the posterior, which supports the anal upon its truncate top. Third or radial ring composed of seven plates—five radials, an azygous, and a large anal. Radials broad, pentagonal, except the right posterior, which is quadrangular and elevated above the plane of the rest by the underlying large azygous, which is pentagonal and of nearly the same size as the rest of the radials, and rises to the same level, lifting the radial above it to the same position as is occupied by the first brachial plates in the other series. Anal plate large, subhexagonal, extending up as high as the right posterior radial; but one other plate belonging to the anal area can be made out in the type specimen—this is slightly smaller than the first, and rests upon its upper face. Brachials 3×5 ; of the same character as the arm joints; on each third brachial a bifurcation

takes place. Arm joints nodose, gradually decreasing in size near the distal extremity, without further bifurcation some 28 joints can be counted in one of the arms. Column round, joints unequal in width by reason of the difference in extent of the central elevations or rims; between the wider ones there are from one to three narrower. It increases somewhat in size after leaving the calyx as far as observed, i. e., about 2 cm.

Another specimen, preserving some of the arms and the ventral tube, shows what seem to have been pinnules; but their exact nature cannot be made out on account of the imperfection of the specimen. The ventral tube is long and rather wide in its compressed state, and is exposed up to about one-half of the height of the arms above which point it is covered by them. Five rows of plates can be seen on the posterior side; the median of which are smooth, hexagonal, and depressed below the level of the others; the two adjoining rows interlock with the median, and are of the same height and about the same width, but are pentagonal and alternate with the adjoining outer rows, having a straight suture line between these rows. The plates of each of the adjoining rows are of the same pentagonal character with their truncate sides presenting at the straight longitudinal suture line, and have the suture lines between the successive plates depressed, and at their termination opposite the middle of the opposite plate, there commences a groove which extends half-way across the plate. This arrangement gives a zigzag ornamentation on each side of the tube.

From the Lower Niagara Limestone, Lockport, N. Y.

I have been somewhat at a loss as to the exact generic relations of this crinoid, on account of what seem to be pinnules, but these may turn out to be lateral armlets.

Glyptaster (Eucrinus) lockportensis n. sp. Pl. III, fig. 4.—Calyx pentagonal below; angles marked by moderately elevated radial ridges, which arise from the underlying basals and meet in the first radials. This ridge grows stronger and more sharply defined after its bifurcation with the second and third series of radials. Surface ornamented by sharply defined and prominent large granules and ridges, arranged in a radiating manner on the larger plates. Under basals small, projecting but little beyond the column. Basals large, pentagonal, posterior one heptagonal. Primary radials 3×5 , secondary 2×10 , and of the tertiary series three can be made out in the only portion so far observed, i. e., the posterior side. In the posterior side the anal area contains upwards of twenty plates, of which the first anal rests upon the truncate top of the posterior basal; it is the largest plate in the area; immediately above this are three somewhat smaller plates, and the succeeding rows of plates decrease regularly in size towards the top.

This species is readily distinguished by its coarse granules or nodes which coalesce and form ridges or striæ towards the margins of the larger plates to meet corresponding ones from the plates adjoining; and the strong radial ridges being comparatively smooth above the primary series. In the primary radials the granulations and rugæ extend somewhat upon them.

From the Lower Niagara Limestone, Lockport, N. Y.

Quite a number of bases and parts of the sides have been found, but no entire calyx as yet. Subgen. *Eucrinus* differs from *Glyptaster* only in the possession of a tertiary series of radials. Wachs-muth and Springer give no American species in their list, and no other publication of one has fallen under my observation.

Ithyocrinus conoideus n. sp. Pl. III, fig. 5.—Calyx inverted conical, evenly tapering by straight sides to the broad base; almost circular in section, there being just the faintest suggestion of angularity radially. Arms, column, etc., unknown. Sub-basals three, entirely hidden by column. Basals five, with just the outer angles presenting beyond the base. The lower angle of the radial opposite the smaller sub-basal extending upon the base.

Three series of primary radials can be observed in the type specimen; they are of the usual form, with a smooth or minutely granulose surface; two of the series contain three successive radials, while the other has four; above each primary series the first primary radials are preserved. In another specimen there are four secondary series of three each.

This species is readily distinguished from *I. lævis*, of the shales, by its elongate calyx with straight sides and its proportionately broader base.

From the Lower Niagara Limestone, Lockport, N. Y.

Eucalyptocrinus muralis n. sp. Pl. III, fig. 3.—Calyx inverted conical; sides nearly straight, but slightly curved outwards; base well defined, about twice as wide as the excavation for the reception of the column. Surface covered with coarse, closely arranged, and at times coalescing, granules with spreading bases, and which are but slightly raised above the general surface of the plates, and seem to be without any definite arrangement into radiating lines, as is usually the case in this genus. Column and arms unknown. Basal plates hidden from view by the retention of a joint of the column. First radial plates large and evenly rounded in at the base to the excavated portion, where they are abruptly bent upwards forming its perpendicular walls. The rest of the plates are of average size and construction, and have the outer face convex, evenly rounded up from the sharply defined suture lines.

VII.—*Coleopterological Notices.*

II.

BY THOMAS L. CASEY.

Read October 6, 1890.

The greater part of the present paper is devoted to the Tenebrionidæ, in an attempt to elucidate the more obscure portions of the family as represented in the United States. • The foundation for this somewhat laborious work rests upon a large amount of material, brought together by the writer during several years' residence in California, supplemented and greatly increased in value by the collections of the National Museum, which were placed in my hands for study and identification through the liberality of Prof. C. V. Riley.

It gives me pleasure also to acknowledge my indebtedness to many other friends for specimens which have still further augmented the material, and consequently enhanced the utility of the systematic revisions. Prominent among these are Messrs. H. F. Wickham, E. A. Schwarz, and Wilhelm Jülich.

NEW YORK, August 11, 1890.

NOTE.

As generic and specific words are mere symbols for the designation of a species, it seems desirable that they should be withdrawn as far as possible from exceptions to general rules of grammar, and, that in this respect at least, they should be treated in the abstract as mere aggregations of letters. The rules of gender should be made uniform, so that generic symbols ending in a certain manner shall demand a certain definite and invariable gender in the specific symbol.

Let us take, for instance, the word *Adonis*. To apply this word to a genus of beetles with any idea of its absolute meaning, would of course be absurd, and, if this be granted, there can be no tenable reason for regarding its gender as masculine and consequently exceptional to the general rule for words

ending in *is*. In fact, in the present state of the science, it is impossible to convey any usefully discriminating meaning by a generic word, for it is evident that such combinations as *Platysoma*, *Megacephalus*, *Brachycerus* and hundreds of others, could each be applied with equal force of meaning to a great number of widely diverse genera.

The only course left, therefore, is to consider the generic name as a simple harmonious combination of letters, having a Latin form, constructed without absolutely essential reference to rigidly correct orthography in the language from which it may have been derived, whether Greek, Latin, or aboriginal American, and subject to constant rules of gender which shall be independent of linguistic caprice. The word may or may not have a meaning in the original language from which it is taken, although in any event, the meaning is of but little material importance. In regard to gender some such rule as the following might be suggested:—

MASCULINE.—All words ending in *as*, *es*, *os*, *us*, *r* or *o*.

FEMININE.—All words ending in *a*, *is* or *s* preceded by a consonant, including *y*, and, in addition, words ending in *e* or *x*.

NEUTER.—All words ending in *m* or *n*.

An attempt at uniformity involving a suppression of the rules of orthography, and made in a spirit similar to that which has prompted the above remarks, has recently come into quite general use—I allude to the growing custom of writing all specific names, whether proper or common, with a small initial letter. All such rules as this, which have for their object the attainment of simplicity and uniformity in scientific nomenclature, are undoubtedly very desirable.

In conclusion I cannot forbear alluding to the unspeakable confusion, into which the gratuitous meddling of mere linguistic purists, has thrown a great deal of what should be rigid and unchangeable symbolization. If we can by any means avoid the unnecessary alteration of original spelling of generic words in the future, it is all that can be hoped for.

COLYDIIDÆ.

The Colydiidæ comprise an extremely heterogeneous assemblage of species, in treating which we must either greatly amplify and generalize our conception of the value of generic characters as derived from experience in the order at large, or must create a relatively great number of genera each very limited in extent. There can be but little question of the propriety of the latter course, if we wish to make the value of generic characters—somewhat indefinite at best—as nearly uniform as possible throughout the order, although it necessitates at the same time a greater complexity of nomenclature. A similar condition is of constant recurrence throughout the order. In the Carabidæ it occurs among the

Lebiini, in the Pselaphidæ among the Ctenistini, and in the Staphylinidæ among the Omalini; it is even more pronounced in many parts of the Cerambycidæ, Tenebrionidæ, and Otiorhynchidæ.

In regard to the genus *Murmidius* and its allies, it is quite clear that their affinities are wholly with *Cerylon* and *Philothermus*, and not at all with the *Histeridæ*, although a few modifications of structure which are characteristic of that family reappear in them. These resemblances are limited to the prosternal lobe and elevated lines alone, for the antennæ are received in deep prosternal excavations in true *Colydiides*, as, for example, in *Megataphrus*, and the retractibility of the legs is of very variable extent and consequently of subordinate value as will appear below. The prosternal lobe, even, is fully developed only in one of the four genera. On the other hand the antennæ, in general form and position, the trophi, and the structure of the abdomen, are entirely similar to those of the *Cerylonini*.

MEGATAPHRUS n. gen. (*Megataphrini*).

Head porrect; sides far overreaching the base of the antennæ, the eyes very rudimentary, consisting of four or five very large circular facets arcuately bordering the anterior basal margin of a small tubercle situated at the sides of the extreme base. Antennæ inserted far in advance of the eye, very slender, 11-jointed, the club abrupt, consisting of two separate but rather approximate joints, one to eight very slender, nearly nude and very sparsely setose, cylindrical, one to five longer than wide, three longer than two and nearly as long as four and five together, six to eight gradually shorter but equal in width, nine slightly transverse, ten abruptly much wider, transverse, eleventh much wider than long, longer than and fully as wide as the tenth, apical joints more densely pubescent. Antennal grooves at the sides of the head very wide and deep, continued directly on to the hypomera, where they are extremely large and deeply excavated, the excavation nearly straight, parallel to the lateral edges, continuing through anterior three-fifths of the prothoracic length and extremely disproportionate to the size of the antennæ, being fully ten times as voluminous and of very great depth. Mentum transverse, with a very strong angulate carina extending from the basal angles to the middle of the apex; interior of the angulate portion concave, not carinate. Ligula short, with a rounded discal tubercle. Palpi moderate; last joint of the maxillary rather large, slightly longer than wide, much longer and wider than the third, ovoidal, obliquely and broadly truncate at apex. Mandibles obtusely notched at apex. Labrum short and transverse, the basal half feebly declivous; the apical vertical. Coxæ moderately widely separated throughout, the anterior as widely so as the intermediate, small, globular, very deeply inserted, the process wide, truncate, scarcely extending beyond the coxæ, the cavities open

behind, the posterior oval, rapidly attenuate laterally and scarcely attaining the metasternal episterna which are rather wide. Abdomen composed of five segments which are free or very nearly so, separated by very coarse, deeply impressed and straight sutures; basal segment nearly as long as the next three together. Legs short, moderately robust; tibiae slender, the spurs not distinct; tarsi slender, tetramerous; joints of the posterior all elongate, the fourth much shorter than the first three combined.

On comparing these characters with the corresponding ones of *Rhagodera* and *Anchomma*, it is readily seen that the antennae differ radically, for, besides being of a usual type and not in the least perfoliate, they have the last joint wide, while in the genera mentioned the last joint is small, exactly as in the *Asidini* of the *Tenebrionidae*; in this connection attention is called to the small terminal joint in *Narthecius*. *Megataphrus* further differs from the *Rhagoderini* in having antennal fossae at the sides of the head and prosternum not only present, but developed to an extraordinary degree, and in the elongate basal segment of the abdomen; it however resembles the tribe mentioned in having the antennae inserted at a great distance from the eyes, which in the present instance are all but obsolete, and in the structure of the anterior coxae, acetabula and prosternal process, also in its roughly scabrous appearance. There seems to be no course left, therefore, but to consider it the representative of a distinct synthetic tribe.¹

M. tenuicornis n. sp.—Oblong, rather robust, parallel, strongly, unevenly convex, piceous-black, dull and roughly scabrous. Head moderate, wider than long, very coarsely punctato-tuberculose, the sides tumid over the antennae, the occiput with a small median fovea. Prothorax anteriorly somewhat as in *Coxelus*, about one-fourth wider than long; base and apex equal, the latter truncate between the large and greatly advanced apical angles, which are rather acute and not rounded; base pedunculate, the peduncle short, three-fifths as wide as the disk, transversely truncate; sides parallel, evenly and distinctly arcuate, minutely but strongly serrate, the teeth tri-

¹ The European genus *Tarphius*, which appears to approach *Megataphrus* in some respects, differs in its broader form of body with non-pedunculated pronotum, in its well-developed eyes which are more approximate to the point of antennal insertion, and in the very short basal joint of the tarsi; in *Megataphrus* the hind tarsi are slender, the basal joint being subequal in length to the next two together. In *Tarphius*, which is considered a member of the *Synchitini*, the antennal grooves are, according to Wollaston, not really excavations, but more feeble impressions. It cannot be denied, however, that the tribe *Megataphrini* is also closely allied to the *Synchitini*, of which it might perhaps with almost equal plausibility form a group.

angular and erect, strongly emarginate posteriorly just before the basal angles of the peduncle; disk strongly elevated in middle third, with a large fovea at each side in the middle, very coarsely tuberculose and dull. Scutellum exceedingly minute, angulate and attenuate at apex. *Elytra* scarcely as wide as the prothorax and about three-fourths longer; sides nearly straight; apex evenly rounded; base truncate between the humeri which are rounded but anteriorly prominent, each elytron with three moderately elevated discal costæ the two outer, as well as the lateral edge—viewed laterally—broadly sinuous in the middle; intervals each with a double series of extremely coarse approximate punctures, the sutural interval with a single series. Under surface dull and roughly scabrous. Length 2.4 mm.

California (Humboldt Co.).

A single representative only was taken by the author near the bay, probably under loose and greatly decayed bark. The integuments throughout, including the femora and tibiæ, are clothed with very short and sparse, robust, but not squamiform setæ, the tarsi very finely, sparsely pubescent beneath and nearly glabrous above.

LYCOPTIS n. gen. (Lycoptini).

The very aberrant genus which I have been forced to regard as the representative of a distinct tribe of the Colydiidæ, may be essentially defined in few words as follows:—

Sides of the head anteriorly not at all extended and but feebly developed horizontally, the basal joint of the antennæ almost entirely exposed from above, although inserted under the sides. Antennæ slender, rather short, 7-jointed, joints three to six slender, seventh forming an abrupt, elongate-oval, solid club, which is apparently composed of three fused joints with a feeble terminal process possibly representing a tenth joint; antennal grooves not well developed. Eyes rather large and prominent, coarsely faceted. Palpi with the last joint elongate-oval, gradually and obtusely pointed at apex and much longer but not thicker than the penultimate. Mandibles finely notched at apex. Coxæ all narrowly separated, the anterior small, transversely oval, gradually pointed externally, the cavities narrowly open behind; posterior strongly transverse, attaining the margin of the epipleuræ. Metasternum large, with a short coarse ante-coxal transverse groove; episterna not very narrow, gradually diminishing in width posteriorly throughout the length, attaining the coxæ, the epimera obsolete. Legs rather slender but short, free; tarsi tetramerous, the basal joint extremely small, the fourth about twice as long as the first three together; tibial spurs extremely short.

The prosternal process is rather narrow and extends behind the coxæ, the apex abruptly expanded and received in a small moderately deeply impressed excavation of the mesosternum; its surface

is transversely tumid, and the lateral angles acute. The metasternal process is short, angulate and transversely tumid or subcarinate. The epipleuræ are horizontal and nearly equal in width throughout, except near the base, where they become a little wider and almost vertical.

The tribe Lycoptini is related in some of its characters to the Sychitini, but differs in the structure of the anterior coxæ which are transversely oval and pointed externally, a character which is extremely rare if not unique in the family. The 7-jointed antennæ also constitute a peculiar character, and there are only the feeblest indications of division in the club visible under special conditions of illumination, the amalgamation being complete; the third joint is slender and much longer than the fourth. *Lycoptis* appears to be one of those connective forms which, with increasing discovery, will in all probability ultimately unite many of the small families of Clavicorns.

L. villosa n. sp.—Oblong, parallel, rather depressed, rufo-ferruginous throughout, feebly shining, the elytra more strongly so; entire upper surface herissate with very long, erect, somewhat sparse but conspicuous hairs. *Head* wider than long, the eyes prominent and convex, the sides before them short and strongly convergent anteriorly from their inner margin; apex broadly truncate; epistoma short, the suture transverse and distinct; sides of the front at each side of the epistoma very slightly tumid; labrum very short and transverse; upper surface feebly, evenly convex, coarsely and densely punctate. *Prothorax* four-fifths wider than long, two-thirds wider than the head, united to the hind body by a short peduncle less than one-half as wide as the base; apex slightly narrower than the base, truncate between the slightly advanced and narrowly rounded apical angles; base transversely truncate throughout the width, the basal angles distinctly and rather broadly rounded; sides extremely feebly, evenly arcuate; disk very feebly convex but strongly declivous laterally, the margins narrowly reflexo-explanate, the lateral edges minutely crenulate, coarsely, very densely punctate throughout, without trace of impressions. Scutellum transversely oval. *Elytra* rather more than three times as long as the prothorax and exactly equal to it in width; sides parallel and straight; apex evenly, semi-circularly rounded; base truncate; humeri right, not rounded; disk nearly flat above, strongly declivous laterally from the sublateral carina; on each elytron there is at lateral third a strongly elevated carina, the surface thence to the suture marked with five feebly elevated lines, interrupted by distant punctures, the intervals each with a single series of rather coarse punctures, the surface thence to the sides having a single feebly elevated but uninterrupted line, the two intervals each with three even series of punctures. Under surface moderately shining, feebly

granulato-reticulate, very minutely and sparsely punctate. *Abdomen* composed of five nearly equal segments, the sutures strong and perfectly straight throughout. Length 2.1 mm.

South Carolina. Mr. Morrison.

A single specimen of this species was kindly presented by Mr. Schwarz.

LASCONOTUS Erich.

This is without doubt one of the largest genera of Colydiidæ, and is particularly well represented in the Californian coast regions; it is withal a clearly limited and but slightly composite genus, although its species differ considerably in habit. The species belonging to the *linearis* group, for instance, are not found under bark, but inhabit the leafy branches of trees, particularly pines, and it will be observed that the general form of these species is more cylindrically convex than those of subcortical habits.

Although the structural characters of the under surface are comparatively constant, there is very great variety in the sculpture of the upper surface, which sometimes becomes very complex.

L. pertenuis n. sp.—Very slender, parallel, rather convex, dull and scabrous, pale brownish-ferruginous throughout; pubescence short, robust, rather sparse but more conspicuous in single narrow lines along the crests of the elytral costæ. *Head* rather large, a little wider than long, slightly constricted at base, flat above, coarsely, densely and indistinctly punctate, the epistoma surrounded posteriorly by a deeply impressed, arcuate groove; eyes rather large, moderately convex, the tempora about one-half as long; antennæ short and robust, the club oval, strong, the ninth joint much shorter and narrower than the tenth. *Prothorax* a little longer than wide; base equal in width to the head; apex a little wider, broadly arcuate; sides just visibly and broadly sinuate; basal angles not at all rounded in the male, rounded in the female; disk very coarsely, rather densely but indistinctly punctate, the interspaces very dull; pubescence forming an intricate and feebly marked tracery; surface broadly, feebly impressed along the middle, the impression becoming narrower and vanishing toward base, where, on each side of it, there is a narrow elongate feeble impression. *Elytra* about two and one-half times as long as the prothorax and just visibly wider, very distinctly wider than the base of the latter; humeri narrowly rounded; apex evenly rounded in circular arc; disk cylindrically convex, each with four fine, feebly elevated, entire ridges, the intervals each with two approximate series of coarse, very close-set, non-setigerous punctures, the setæ borne by very minute punctures at the sides of the interval separating the series, one for every coarse puncture, the setæ subrecumbent and directed obliquely toward the ridges. *Abdomen* rather coarsely but sparsely and indistinctly punctate. Length 2.4–2.6 mm.

California (Monterey).

The most slender species known to me, belonging near *linearis* Cr., but smaller, pale throughout and with finer, sparser punctuation, especially of the abdomen. As in the species mentioned the real punctures of the pronotum are very fine, each situated on the summit of a relatively coarse tubercle.

Structurally, this species differs from *linearis* in the antennæ and maxillary palpi, the antennal club being parallel and with joints nine and ten almost equal in *linearis*. In *pertenuis* the terminal joint of the maxillary palpi is shorter, more parallel and more broadly truncate at apex; these differences are quite conspicuous in degree.

L. nucleatus n. sp.—Rather slender, parallel, convex, piceous-brown, dull; pubescence coarse, short and recumbent but not squamiform. *Head* a little narrower than the base of the prothorax, parallel, broadly truncate, very slightly wider than long, feebly constricted at base; upper surface rather flat, coarsely, densely punctate and scabrous; eyes small, a little shorter than the tempora, slightly prominent; antennæ rather long and slender, very sparsely clothed with long herissate setæ which are very conspicuous on the club, the latter elongate, subparallel and loose, joints one to six or seven longer than wide. *Prothorax* fully as wide as long, strongly narrowed from apex to base, the sides broadly but rather strongly sinuate throughout; apex much wider than the base, broadly, feebly arcuate; basal angles rather acute, not rounded; disk with complex tracery and very feeble impressions nearly as in *pertenuis*, coarsely granulato-punctate. *Elytra* nearly three times as long as the prothorax and a very little wider than the disk of the latter; sides parallel and almost straight; humeri narrowly rounded; apex very slightly conjointly produced in the middle as a squarely truncate lobe; disk without trace of longitudinal costæ, but in their place having slightly broader flattened nude and impunctate intervals, which are interrupted at long distances by small tumid elevations, bearing a dense tuft of whitish setæ; spaces between the flat tumuliferous intervals occupied by a double line of coarse, non-setigerous punctures, the two series very approximate, the interval separating them bearing a very closely-spaced double line of coarse yellowish setæ, which are pointed longitudinally backward. *Abdomen* very dull and scabrous, the punctures rather sparse and indistinct. Length 2.7–3.4 mm.

California (Monterey).

I obtained a small series of this species from the blossoming branches of the Monterey pine. Although belonging to the *linearis* division of the genus, it is at once distinguishable from any other described form, by the densely pubescent nuclei of the elytra and the absence of costal lines. It is more robust than *linearis*.

L. apicalis n. sp.—Parallel, moderately slender, rather depressed, flat above, the elytra vertical at the sides, dark rufo-ferruginous throughout, very slightly shining; pubescence very short and sparse, moderately coarse. *Head* moderate, nearly as long as wide, quite distinctly narrower before than behind the eyes, the latter moderate, very slightly convex and about two-thirds longer than the tempora; occiput slightly constricted at base; upper surface feebly impressed at the sides of the epistoma, finely, sparsely punctate, the punctures becoming denser and coarsely tuberculous toward the sides; antennæ well developed, rather stout, the pubescence rather dense, moderate in length, club wide, nearly parallel, rather loose, the ninth joint distinctly shorter although but little narrower than the tenth, third scarcely one-half longer than wide. *Prothorax* scarcely visibly longer than wide; sides extremely feebly convergent from apex to base, straight in direction although slightly undulated; base with a very short wide truncate median lobe; basal angles slightly obtuse but not rounded; apex nearly transverse but feebly bilobed, the margin of the lobes tumid; disk finely, rather sparsely punctate, each puncture at the summit of a small elevated tubercle; the tubercles dense; surface broadly, feebly impressed in the middle in anterior two-thirds, also with three feeble impressions near the base forming a posteriorly pointed triangle, otherwise even. *Elytra* about two and one-half times as long as the prothorax and nearly two-fifths wider; apex semi-circularly rounded; humeri very narrowly rounded; sides parallel and nearly straight; disk with broadly elevated suture and four rather strong straight costæ on each elytron, the summit of the costæ distinctly, densely punctate, not very conspicuously setose, the intervals each with two very approximate series of coarse close-set punctures, the small sub-recumbent setæ arranged as in *pertenuis*; scutellar series long and distinct; first discal costa abruptly obsolete at apical fifth, the surface between the thence feebly elevated suture and the second costa nearly flat, polished and extremely sparsely, finely punctate thence to the apex. Under surface throughout very coarsely, densely, deeply and distinctly punctate, the punctures slightly transverse and feebly reniform, the small inconspicuous setæ arising from their anterior margins. *Legs* moderate; tarsi slender. Length 3.4–3.7 mm.

California (Santa Cruz Co.).

In some characters this remarkably distinct species is intermediate between the ordinary forms with all the elytral costæ entire, and the *pusillus* group in which the first discal costa is abbreviated; this abbreviation is most extreme in *concavus*.

L. concavus n. sp.—Rather robust, depressed, subparallel, black; legs and antennæ rufo-testaceous; upper surface alutaceous, the pubescence not very coarse, extremely short, very dense throughout. *Head* slightly wider than long, the sides arcuate and convergent before the eyes which are well developed but not at all prominent, the tempora very short; base rather strongly, abruptly constricted; surface nearly flat, with two very large feeble impressions separated by a longitudinal and feeble elevation; punctures sim-

ple throughout, fine but deep and rather dense; antennæ rather short, the club broad and almost parallel, third joint short, scarcely as long as wide, very slightly longer and wider than the fourth. *Prothorax* very slightly wider than long; sides rounded anteriorly, thence feebly convergent and nearly straight to the broadly rounded basal angles; basal pedunculiform lobe extremely short and broad, truncate; apex transverse; disk abruptly and very deeply excavated throughout the length, the excavation but slightly longer than wide, and three-fifths as wide as the entire prothorax; punctures rather fine but deep and very dense throughout, simple and not in the least tuberculous. *Elytra* about two and one-half times as long as the prothorax and very slightly wider; sides subparallel, nearly straight, feebly arcuate near the humeri which are narrowly rounded; apex gradually, evenly rounded; base broadly, rather strongly emarginate; disk very broadly, strongly concave between the second discal costæ throughout the length, the first costa feeble and extending from the base for one-seventh or one-eighth the length, totally obsolete elsewhere; costæ two to four well developed; surface finely, very densely punctate, the concavity having extremely indistinct unimpressed series of very slightly larger punctures, the intervals between the lateral ridges biserially and rather finely punctate. *Abdomen* and metasternum polished, rather coarsely, moderately densely and very distinctly punctate. *Legs* moderate, the femora very robust. Length 2.8 mm.

New Mexico (Las Vegas). Mr. H. Meeske.

This small species belongs to the *pusillus* group and represents an extreme development of its structural peculiarities; it is very much broader than *laqueatus* Lec.

The three species of the *pusillus* group may be distinguished as follows:—

First elytral costa feeble but traceable behind the middle.

Elytra gradually, rather strongly concave toward apex; base strongly emarginate; pronotal punctuation simple throughout, without trace of elevated tubercles.....**pusillus**

Elytra not distinctly concave, just visibly sinuate at base; pronotal punctures fine, situated on the summits of coarse feebly elevated tubercles.

laqueatus

First elytral costa only visible near the base; pronotal punctures simple.

concavus

Besides the more elongate and narrower form of *pusillus*, there are many other characters distinguishing it from *laqueatus*.

CERYLON Latr.

C. californicum n. sp.—Elongate, subparallel, feebly convex, piceous, polished, the upper surface with erect and rather long but extremely sparse and inconspicuous hairs, growing from the punctures. *Head* transverse, feebly

convex, rather coarsely but very sparsely punctate; antennæ very robust, basal joint large, angulate behind, joints two to eight equal in width and almost equal in length, subquadrate, compactly joined, ninth a little wider, slightly wider than long, the posterior side longer than the anterior, club abrupt, one-half longer than wide, distinctly composed of two fused joints. *Prothorax* quadrate, just visibly wider at apical fourth than at base; sides thence nearly straight to the base, rounded and convergent anteriorly; apex very feebly incurvate; base transverse, the median lobe very feeble; disk feebly convex, abruptly nearly perpendicular at the very shallow flanks, the marginal bead extremely fine; punctures very coarse, perforate, sparse but rather dense toward the sides, except near the base. Scutellum moderate, transversely oval. *Elytra* nearly twice as long as the prothorax and, in the middle, nearly one-fourth wider than the latter; sides parallel and very distinctly arcuate; apex evenly rounded; disk with extremely feebly-impressed series of rather fine, somewhat distant punctures; intervals nearly flat, each with a single series of very minute widely distant punctures. Under surface throughout coarsely but rather sparsely punctate. Length 3.0 mm.

California (Lake Tahoe and Siskiyou).

A conspicuously distinct species, distinguished from *unicolor* by its much larger size, piceous color, coarse punctuation, erect hairs of the upper surface and many other characters.

LAPETHUS n. gen. (Murmidiini).

Body oval, compact; head deflexed, the trophi in part concealed in repose by the short prosternal lobe. Antennæ inserted in deep foveæ on the front, just before and between the eyes the condyle of the basal joint exposed when the organ is reflexed, rather slender, straight, cylindrical, 10-jointed, the last three joints fused into a robust, compact, oval and very abrupt club. Maxillary palpi with the first two joints rather slender, the third abruptly very large, oval, compressed, the fourth slender, subulate, obliquely inserted in the apex of the third. Labial palpi with the first joint very small, second very large, oval, compressed, the third subulate and oblique. Mentum small, angulate at apex, finely and strongly carinate along the middle. Labrum as long as wide, the sides straight and strongly convergent from base to apex, the latter narrow and with a deep angulate notch; between its upper surface and the epistoma there is a short transversely truncate basal piece which is corneous; both this and the labrum proper are retractile. Eyes rather small, coarsely faceted. Pronotum widely separating the small globular coxæ, the cavities apparently open behind, the process wide, extending far behind the coxæ, the apex broadly rounded and closely fitted in a corresponding emargination of the mesosternum, its surface continuous with that of the mesosternum; hypomera wide, excavated throughout the width in anterior half for the reception of the anteunal club, the anterior portion of the excavation separated from the median lobe by a deep elongate cleft for the reception of the funicle;

lateral angles of the median lobe rather acute and prominent, the apex truncate. Middle and hind coxæ very widely distant, the latter small, transverse and attaining the metasternal episterna, the latter extremely narrow and linear but dilated behind, the suture fine but distinct. Anterior and middle legs retractile, the posterior free; tibiæ compressed, slender toward base, swollen and obliquely truncate externally toward apex, the truncate surface smooth and polished and bordered on each side by a fringe of short setæ, the external edge carinate from base to the truncation just mentioned; tarsi slender, the first three joints small, subequal and, in the posterior, together about one-half as long as the fourth; claws slender, normal.

The last vestige of the posterior crural excavation is visible as a fine straight line, extending obliquely from the inner side of the coxa and vanishing near apical third of the first segment.

In the structure of the palpi, maxillary lobes, insertion of the antennæ and carination of the mentum this genus is an analogue of *Cerylon*, but in the retractile legs and antennal excavations it is allied to *Murmidius*; in fact it constitutes an almost conclusive proof that the *Murmidiini* are merely a group of the *Colydiidæ* and closely related to the *Cerylonini*, the principal distinctive features being the 10-jointed antennæ received in excavations. In *Cerylon* the antennæ are 11-jointed, the club being composed of two amalgamated joints as in *Murmidius*. In *Lapethus* the club is composed of three fused joints.

The three genera *Cerylon*, *Lapethus* and *Murmidius* differ however in sternal structure to an astonishing degree, for in *Cerylon* the prosternal process extends over the surface of the mesosternum and in *Lapethus* is received in an emargination of the latter, while in *Murmidius* the mesosternum extends over the surface of the prosternum, advancing considerably upon it and partially concealing the anterior coxæ.

L. discretus n. sp.—Rather broadly oval, moderately convex, dark rufo-testaceous throughout, highly polished, the upper surface with rather long, fine, erect and stiff setæ which are very sparsely distributed. *Head* feebly convex, extremely finely and sparsely punctate but coarsely and more densely so toward base; epistomal suture completely obliterated. *Prothorax* nearly one-half wider than long, at base nearly three times as wide as the head, very strongly narrowed from base to apex, the latter broadly, feebly emarginate, nearly one-half as wide as the base, the latter transverse, broadly, arcuately lobed in the middle, closely fitted to the base of the elytra throughout the width; sides rather strongly arcuate, nearly parallel in basal third; disk very vaguely, transversely impressed almost throughout the width near the base, very sparsely, moderately finely punctate, the sides margined with a

thick acute bead. Scutellum moderate, very distinct, almost circular. *Elytra* subequal in width to the prothorax and twice as long, gradually rather strongly rounded at apex, the sides anteriorly very feebly arcuate; base equal in width to that of the prothorax; disk with rows of very coarse punctures which become feeble near the sides and almost completely obliterated in apical third or fourth. Under surface extremely sparsely and inconspicuously punctate, polished. *Legs* short, the femora rather robust. Length 1.8–2.0 mm.

California (Humboldt Co.).

I obtained two specimens of this extremely interesting species under old bark near Humboldt Bay.

BOTRODUS n. gen. (Murmidini).

Body oblong-oval, rather strongly convex. Head deflexed, the trophi partially concealed in repose by the moderately developed prosternum. Eyes rather large, rounded, coarsely faceted. Antennæ inserted at the sides of the front in very small foveæ adjacent to anterior margin of the eye, 10-jointed, the club moderate in size, abrupt, oval, solid and consisting of two amalgamated joints; basal joint rather large, broadly angulate anteriorly; second much smaller, conical; three to eight slender, very compactly joined, affixed obliquely to the apex of the second joint; antennal grooves wanting, the club received in a small deep excavation in the apical angles of the prothorax, visible anteriorly but not from above. Palpi not very robust, the last joint slender, acuminate, conical and slightly oblique, in the maxillary nearly equal in length to the penultimate and a little more slender. Mentum extremely small. Mandibles finely notched at apex. Labrum very short and transverse. Epistoma extremely large, fully one-half as long as the entire head and continuous with it in convexity, the suture very fine and extending between the antennal foveæ. Anterior coxæ very small, globular, very distant, the cavities apparently open behind, the prosternum with two very fine widely distant lines, diverging from the coxæ, the process very wide, extending under the mesosternum. Mesosternum between the coxæ very broad, advancing anteriorly beyond the coxæ as a broadly rounded, heavily beaded lobe, which extends partially over the prosternum, the metasternal suture very feeble. Metasternum very large, the episterna narrow, inflexed behind to meet the coxæ; suture very feeble; posterior coxæ small, transversely oval, widely separated. Abdomen consisting of five segments with straight, rather feeble sutures, the basal segment not quite as long as the remainder together. Legs rather short, not received in excavations, the femora robust, extending laterally beyond the sides of the elytra; crural cavities perfectly obsolete but represented by feebly elevated lines, extending obliquely on the metasternum and first ventral segment, from the inner limits of the coxæ.

This genus has several characters in common with *Myhocerus*, such for instance as the position and extent of the antennal excava-

tion, but as the legs are entirely free I do not think that it can properly be considered identical, especially as the general habitus is quite different.

The structure of the mesosternum anteriorly reminds us somewhat of *Phalacrus*, but is perfectly similar to the same part in *Murmidius ovalis*; in both, the fine sutural line separating the sterna is posteriorly angulate, unimpressed and is situated at the middle of the coxal cavities as in *Cerylon*; it is very feebly marked in the present genus. In *Cerylon* the mesosternum is very much longer and the prosternal process extends over its surface for a short distance, as before remarked.

The absence of crural excavations and the imperfectly retractile legs in this genus, together with the corresponding structure as described in *Lapethus*, seem to prove that the retractibility of the legs is not a character of even tribal importance. In fact the 10-jointed antennæ and presence of antennal excavations are the only characters of value which separate the *Murmidini* from the *Cerylonini*, and these two intimately related tribes are separated from the majority of *Colydiidæ* by the frontal insertion of the antennæ. In this connection it should be stated that in the *Bothriderini* the palpi are of similar structure, except that the last joint has become larger, but it is still finely attenuate and conical; this, together with the exposed insertion of the antennæ, indicates a close relationship.

B. estriatus n. sp.—Oblong-oval, rather convex, strongly shining, piceous; pubescence consisting of excessively minute, sparse, fine and recumbent hairs growing from the punctures. *Head* much wider than long, feebly, evenly convex, feebly and coarsely reticulate, very finely, sparsely punctate. *Prothorax* a little more than twice as wide as the median length, slightly narrowed from base to apex, the latter broadly, feebly sinuate, the bottom of the sinus broadly arcuate; apical angles rather broadly rounded; base broadly angularly lobed in the middle, closely fitted to the base of the elytra throughout the width; sides nearly straight, arcuate anteriorly; disk evenly, broadly convex, feebly reticulate, very finely, sparsely punctate, the sides margined with a thick convex bead which extends along the apex as a very fine bead; base not margined. *Scutellum* very small, elongate, finely acuminate. *Elytra* fully three and one-half times as long as the prothorax; base a very little wider than the base of the latter, the humeri just visibly exposed; sides parallel and very feebly arcuate; apex broadly, evenly rounded; disk evenly, transversely convex, minutely and very sparsely punctate, the punctures evenly distributed but without the slightest trace of serial arrangement. Under surface extremely minutely and sparsely punctate throughout, polished. Length 1.3 mm.

Texas (Columbus).

The tibiæ and tarsi are slender, the tarsi tetramerous, the fourth joint of the posterior a little longer than the first three together, the basal joint about as long as the next two, slightly dilated and with a brush of long hair beneath, the remaining joints slender and almost glabrous throughout. The tibial spurs are not distinct.

I am indebted to Mr. Schwarz, whose generous gifts of specimens have often been referred to, for a representative of this very interesting species.

The genera of Murmidiini may be distinguished as follows:—

Antennal cavity dorsal; legs retractile **Murmidius**
Antennal cavity apical.

Legs retractile; elytra with series of coarse punctures..... **Myhocerus**

Legs free, the femora extending beyond the body; elytral punctures without trace of serial arrangement..... **Botrodes**

Antennal cavity inferior; anterior and intermediate legs retractile, posterior free; elytra with rows of coarse punctures..... **Lapethus**

CUCUJIDÆ.

As organized at present this family is perhaps the most composite of the Clavicorns, several of the subfamilies exhibiting such strong transitional affinities toward other families that there is really very little reason for considering the latter distinct. The Passandrinæ, for example, exhibit a very close relationship with the Colydiidæ, and two of the four genera composing it in our fauna have the tarsi tetramerous; as further proof of this relationship it should be stated that some genera of Colydiidæ, as for instance *Sosylus*, have a rudimentary process corresponding to the jugular plates of the Passandrinæ.

NARTHECIUS Lec.

This very isolated genus should be removed from the Cucujinæ and placed in the Passandrinæ, with the characters of which it is in stricter harmony. The jugular plates in *Narthecius*, although feebly developed, are distinct. The tarsi are perfectly tetramerous throughout,¹ with the basal joint small and the fourth long. The

¹ In my revision of the Cucujidæ the tarsus of this genus is drawn with five joints; the drawing is however incorrect, the division between the third and fourth joints being an optical illusion in the somewhat imperfect specimen

elytra have each five fine ridges, the intervals being finely, sparsely and sublinearly punctate. The epipleuræ are extremely narrow and do not occupy the entire inflexed sides except at the humeri where they become rapidly dilated as in many Tenebrionides. The metasternum is extremely long, the side-pieces rather wide anteriorly, but rapidly narrowing thence to the apex, where they are generally more or less covered by the elytra. The lateral margins of the prothorax are marked by an extremely feeble fold which is generally completely obsolete near the apex. In the presence of a fine longitudinal line near the sides of the pronotum *Narthecius* exhibits a line of consanguinity with the true *Cucujinæ*, and the synthetic nature of the genus is proved in addition by several other structural characters.

The sexual modifications of the *Passandrinæ* are not very conspicuous and are generally extremely feeble, in marked contrast to the *Cucujinæ* where these differences become extreme. I have but little doubt therefore, that the characters which are employed in the following table will be found practically independent of sex. The three species before me may be thus distinguished:—

Median apical process of epistoma broader, bifid at apex.

Head very long; occiput with a distinct broadly impressed median groove toward base; antennæ scarcely as long as the head; nuchal constriction distant from the eye by nearly twice the length of the latter; supra-orbital carinæ extending behind the eye a distance far exceeding its length. Prothorax much shorter than the head: pronotum unevenly punctate, more coarsely near the middle, finely so elsewhere. Elytra shorter than the head and prothorax together. Length 2.8 mm.

Pennsylvania **grandiceps** Lec.

Head scarcely longer than wide; occiput without median groove; nuchal constriction distant from the eye by scarcely more than the length of the latter; supra-orbital ridge arcuate, obsolete at less than the length of the eye behind its posterior margin; antennæ nearly one-half longer than the head, the basal joint much longer than wide, convex, last joint oval, longer than wide, much narrower than the tenth. Prothorax longer than the head, longer than wide, nearly as in *grandiceps*, but evenly and very densely punctate throughout. Elytra distinctly longer than the head and prothorax together. Length 2.6 mm. California (Santa Cruz Co.) **simulator** n. sp.

figured. In this connection it may be said that any statements made at the present time, which are in conflict with the language or delineations of the revision referred to, must be considered as abrogating the latter.

Median process of the epistoma narrower and more acuminate, absolutely simple and obtusely subtruncate at apex. Head not longer than wide, the occiput without median groove; eyes larger, more convex; nuchal constriction more feeble, situated at scarcely more than the length of the eye behind the latter; supra-orbital ridge arcuate, obsolete at less than the length of the eye behind its posterior margin; antennæ robust, about one-half longer than the head, the basal joint short and wide, flattened. Prothorax much longer than the head, longer than wide, moderately densely punctate, more coarsely so toward the middle. Elytra equal in length to the head and prothorax together. Length 1.7 mm. Florida (Haw Creek).

breviceps n. sp.

The basal joint of the antenna is very different in *simulator* and *breviceps* and, in the former, somewhat resembles that of *grandiceps*.

PTINIDÆ.

PTINODES Lec.

The following species is referred to *Ptinodes* with some doubt; it however belongs to the group *Anobia*, and the abdomen and metasternum are unexcavated, the antennæ simple with elongate club and received in repose between the widely separated anterior coxæ, the femora clavate and the tarsi dilated.

P. cristatus n. sp.—Very robust, compact, subcylindrical, densely pubescent and clothed in addition with long, erect hairs and fasciculate tufts of setæ, of which four on the pronotum are very approximate and prominent; integuments piceous-black, the vestiture confusedly variegated with white, brown and black, the sides of the pronotum, humeral regions and two sutural spots white and more prominent; pubescence of the under surface short, fine, extremely dense, cinereous in color. Head moderate, feebly convex; eyes large, prominent, coarsely faceted; antennæ somewhat robust, the three outer joints together much longer than the entire remainder, basal joint robust. Prothorax about three-fourths wider than long; sides rounded at anterior third, thence rather strongly convergent and nearly straight to the base, the latter broadly, evenly arcuate, about as wide as the apex, in close contact with the elytra throughout; apex very feebly emarginate; apical angles right, not rounded; disk strongly gibbous in the middle, impressed near each apical angle, not canaliculate, having small, unevenly scattered tubercles, each bearing a long hair, the short matted pubescence growing from the interspaces. Scutellum as long as wide, parabolic. Elytra scarcely one-half longer than wide, fully one-third wider than the prothorax, broadly rounded behind; sides parallel and nearly straight; base broadly emarginate for the prothorax; humeri broadly exposed, rounded; disk with small widely scattered tubercles, tufts of setæ, erect hairs and fine densely matted pubescence. Abdomen exces-

sively finely, densely punctate, also sparsely and more coarsely punctate, these punctures becoming tubercles toward the sides. *Legs* robust; *tibiæ* with long coarse hairs and an extremely dense fringe of shorter ones externally; spurs very minute, slender, subequal; *tarsi* very robust. Length 5.0–6.0 mm.; width 2.7–3.2 mm.

California (Santa Cruz Co.).

An ample series of this well-marked species has recently been sent to me by Mr. Harford; the vestiture is singularly complex.

LYCTUS Fab.

The exterior apical angles of the anterior *tibiæ* are acute and slightly produced in *Trogoxylon* as well as *Lyctus*, the difference between the two genera being so slight in this respect, that it will not serve as a distinguishing character; they may be separated as follows:—

Anterior *coxæ* contiguous or very narrowly separated **Lyctus**
 Anterior *coxæ* very widely separated **Trogoxylon**

The species of *Lyctus* within our territories may be easily identified as follows:—

Elytra with even series of rather large, very shallow, rounded punctures, the intervals each with a single uneven line of fine, coarsely setigerous punctures..... **striatus** Melsh.

Elytra with series of very minute, setigerous punctures, the punctures of the intervals coarse, deep, perforate, elongate and either confusedly arranged or disposed in two uneven lines.

Prothorax with the sides nearly straight, very feebly narrowed behind from apex to base.

Anterior *coxæ* separated by scarcely one-fourth their width; antennæ long and slender, with joints one to nine longer than wide, the tenth not wider than long; prothorax quadrate slightly narrower than the elytra, with a rather pronounced elongate-oval discal impression.

cavicolis Lec.

Anterior *coxæ* separated by about one-third their width; antennæ short and robust, outer joints of funicle subquadrate, not longer than wide, tenth distinctly wider than long; prothorax longer than wide, very much narrower than the elytra, dull and densely punctate, the median line very obsoletely impressed **opaculus** Lec.

Anterior *coxæ* distant by about one-half their width; antennæ moderate, the tenth joint very distinctly wider than long; prothorax but very slightly narrower than the elytra, distinctly wider than long, shining, rather sparsely punctate, feebly, longitudinally impressed in the middle.

planicollis Lec.

Prothorax with the sides broadly rounded anteriorly, thence very strongly convergent behind to the base, the disk anteriorly not narrower than the elytra, distinctly wider than long, convex, not impressed in the middle, very dull and extremely densely punctato-scabrous; antennæ long and slender, the ninth joint much longer than wide, the tenth about as long as wide; anterior coxæ separated by rather less than one-third their width **parvulus** Cas.

The individuals of all the species vary remarkably in size. The type of the species described by me as *parvulus* was labeled "Arizona," but as I have subsequently received an ample series from the vicinity of Monterey, California, there may possibly be some error in the former locality. This species is very isolated in many of its characters, and is more widely separated from *opaculus*, with which it has been considered synonymous, than any other known species except *striatus*; its length is 2.4–4.7 mm.

It is almost superfluous to add that *cavicollis* Lec. is in no way allied to *striatus*, the punctuation of the elytra being of a totally different kind.

TENEBRIONIDÆ.

This large and interesting family is probably comparatively modern in geological development, and may possibly be contemporaneous with the Scarabæidæ. The investigations made known in the following pages are intended to exhibit—in an imperfect and fragmentary way—the correlative affinities of the old and new world faunæ, as far as it has been possible to procure representatives of the foreign genera, and especially in that obscure portion involving the first few tribes of the subfamily Tenebrioninæ; also to classify the species pertaining to the more neglected of the North American genera, such as the *Thinobates*, *Coniontis* and the *Blapstini*.

In comparing the Tenebrionidæ of the palæarctic fauna with those of North America, it seems that as far as structural variety and singularity of form are concerned, the nearctic species are considerably less highly evolutionized. Such specialized types as *Aræoschizus* and *Usechus*, for instance, are represented with us by two small genera, while in Europe there are several, exhibiting great variety, such as *Adelostoma*, *Eutagenia*, *Stenosis*, *Oogaster*, *Dichillus* and the curious *Leptodes*. The very diversified and conspicuous *Pimeliini*, the isolated *Pedinus* and very aberrant *Cossy-*

phus, are peculiar to Europe and without any immediate allies in North America, while the interesting genera *Arthrodeis*, *Erodium* and *Adesmia* are represented by a few species of *Edrotes*, of very much smaller size and much less conspicuous variety.

The European *Asida* and *Blaps* are almost exactly equaled in extent and variety by the American *Asida* and *Eleodes*, but while there are very few other palæarctic genera exhibiting much persistence of type, a considerable part of the remainder of the nearctic fauna is made up of large genera, composed of small, less striking and more monotonous forms, such as *Eurymetopon*, *Emmenastus*, *Coniontis*, and *Blapstinus*. Even *Opatrum*, which appears to replace our *Blapstinus* to a great extent, is composed of very much larger and more varied species. On the other hand, however, such peculiar forms as *Sepidium*, *Elenophorus* and *Cephalostenus* may fairly said to be offset by our much more numerous *Zopherini* and *Embaphion*.

A greater diversity of climatic and other physical conditions prevailing in Europe is, in all probability, the direct cause of the condition referred to, and the *Tenebrionidæ* are not the only family which exhibits this superior elaboration, if such an expression be allowable, for the same is observable to some extent in the *Carabidæ*; but, as a partial compensation, the American *Staphylinidæ* exceed the European in abundance and in diversity of type, to a corresponding degree.

This may possibly be a collateral proof that the *Staphylinidæ* are older geologically than the *Tenebrionidæ* (see *Ann. N. Y. Acad.* V, p. 195), especially if we assume that early and comprehensive types are more readily modified by environment than the later and more specialized, for during the epochs immediately succeeding the Carboniferous, North America probably possessed conditions far more varied than those which then prevailed in Europe; consequently the primitive and sythetic types of any family which may happen to have existed at that time, would be more diversified, and would transmit to the present a still more numerous and varied set of typical forms. As the conditions which now make Europe superior to America in evolutionizing power, were not brought about until the Tertiary, it follows that any family which had its origin near this epoch would be at present the more differentiated in Europe.

TRIOROPHUS Lec.

The males of *Triorophus* are distinguished from the females by a small, abruptly limited, slightly elongate-oval spot in the middle of the basal segment of the abdomen; which is extremely finely, densely punctate and excessively finely, velvety-pubescent. In this connection attention is called to the fact that in a great many species of *Blapstinus*, the ordinary punctures become slightly more densely aggregated in the same region and probably for a similar reason. The sexual differences in the present genus are otherwise very feeble, the male being but just visibly less robust than the female. The following species, represented by a male and female, belongs to the *lævis* group:—

T. lecontei n. sp.—Robust, very convex, elytra strongly inflated, intense black throughout; integuments strongly shining. *Head* very slightly narrower than the prothorax, finely, sparsely punctate throughout, nearly smooth, the frontal umbo large, very strongly elevated and subangulate when viewed laterally, the median lobe of the epistoma long, angulate at apex; mandibles extremely densely punctate; eyes rather small, less prominent than the lateral lobes in front of them, the supra-orbital ridge strong and straight, with one or two very short inner folds near the base only; antennæ very long, the tenth joint triangular, longer than wide, shorter than the eleventh which is elongate-oval. *Prothorax* nearly one-third wider than long; apex one-third wider than the base, truncate, the apical angles small but acute, anteriorly prominent and dentiform, bearing a cluster of long slender setæ which extend partly over the eye; base transversely truncate, the basal angles slightly obtuse but not rounded and a little prominent; sides moderately arcuate, more convergent in basal half; disk very convex, coarsely, very deeply punctate, the punctures distinctly separated throughout, finer toward the middle; base margined with an extremely thick convex bead. *Elytra* oval, two and one-half times as long as the prothorax and, in the middle, rather more than one-half wider; base truncate and equal to that of the prothorax; disk with nine unimpressed series of very coarse deep punctures, the series obsolete at apical fourth; intervals from four to five times as wide as the serial punctures and excessively minutely, sparsely and feebly punctate. *Legs* long and slender. Length 8.0–8.5 mm.; width 3.7–4.0 mm.

Texas (El Paso). Mr. Dunn.

The vibrissæ near the apical thoracic angles are similar to those of many *Otiorhynchides*; they appear to be generic and have not been referred to in any published descriptions which I have seen.

This species differs from *lævis* in its much more robust and inflated clytra, coarser punctuation, more prominent apical angles

of the prothorax, and more angulate frontal umbo; in *lævis* the elytral series become obsolete slightly behind the middle and are composed of much finer punctures than in *lecontei*. In the very large series of *lævis* from various localities which I have before me, there are indications of several more or less distinct varieties.

EPITRAGINI.

There seems to be a certain bond of affinity uniting the genera Eurymetopon, Emmenastus, Auchmobius, Cnemodus, Epitragus, Schœnicus, Chilometopon and Trimytis, which is expressed not only by a general similarity of habitus, but also by important structural peculiarities. The abdominal process for example is acute or acutely rounded in all, the posterior coxæ, in a transverse sense, are long, subparallel and linear, being also generally more or less oblique, and the metasternum has a broadly interrupted transverse groove,¹ parallel and very near to the posterior margin; this groove becomes subobsolete only in a few aberrant species of Emmenastus and in Trimytis,—both of which must be considered as degradational types,—where it is represented by a series of finer punctures which is generally more or less broadly impressed. The wings are very exceptionally absent and are usually well developed. In the opinion of the writer these genera should constitute, therefore, but a single tribe as named above, which may readily be subdivided into groups. The Epitragini are peculiarly American.

The Gnathosiini, comprising the genera Gnathosia, Stibia, Triorophus, Triphalus, Pachychila, Anatolica, Tentyria, Microdera,

¹ This groove, although possibly corresponding to the transverse metasternal line of the Carabidæ, is not at all similar to it. In the case of the Carabidæ, the line is perfectly continuous, and completely separates from the main body of the metasternum a transversely triangular "ante-coxal piece;" here, however, there are really two independent grooves, which generally—though not always—begin at the posterior margin near the inner side of the acetabulum, and extend outward, parallel in curvature with its anterior edge, abruptly terminating before attaining the episternum. The exact taxonomic value of these grooves I have not ventured to determine, but they constitute a very constant character throughout the greater part of the Tenebrioninæ, and the Epitragini, in which they are also well developed, seem to approach that subfamily in abdominal structure more closely than any other tribe not included within its limits, for in some specimens, especially of Chilometopon, there appears to be a rudimentary coriaceous margin at the middle of the third and fourth ventral segments.

Colposcelis, *Calyptopsis*, *Capnisa* and others, is distinguished by the narrow but truncate abdominal process, the short broadly oval and outwardly pointed posterior coxæ, a complete obliteration of the metasternal groove, the entire and universal absence of wings, and the thicker and denser integuments. In the genus *Capnisa*, however, there is a feeble indication of the groove as a very fine short impressed line opposite the inner part of the coxæ; this simply denotes that *Capnisa* may have a remote line of affinity with some other tribe, and is a matter of but little consequence when developed to such a rudimentary degree. It will require but a short study of the European genera, in conjunction with that of the single genus *Eurymetopon*, to show that the nature of the front is of quite uncertain value in a tribal sense.

Edrotes must be placed in a distinct tribe on account of its very peculiar mesosternal structure, but I can perceive no great necessity for separating *Craniotus* from the *Gnathosiini*, except it be the more widely separated posterior coxæ.¹ *Usechus* should be united with the *Zopherini*.

THINOBATES.

The two genera at present composing this group of the *Epitragini*, as represented in the United States and Mexico, are both extremely heterogeneous and are resolvable into some eight or nine distinctly limited sections, which are at least of subgeneric value. All of the species are more or less local and most of them extremely so; indeed the entire genus *Eurymetopon* is very circumscribed in habitat, being confined to the country bordering the Mexican boundary of the United States to the westward of San Antonio in Texas, and with its principal focus in southern Arizona. *Emmenastus*, however, is more widely diffused, extending from the southwestern parts of the United States through Mexico and Central America and

¹ The acute and prominent lateral lobes of the front, urged by Horn (*Trans. Am. Ent. Soc.*, 1874, p. 29) as an important tribal character, is apparently not entitled to such rank; the same difference can be observed between the front of *Epitragus submetallicus* and *E. pruinosus*; the form of the metasternal episterna also seems to have been given too great value in this connection. The genus is quite abnormal, however, and should certainly constitute an isolated group of the tribe *Gnathosiini*.

northward along the Pacific coast to Alaska. The two genera may be distinguished essentially as follows:—

Anterior tibiæ acutely produced and prominent externally at apex.

Eurymetopon

Anterior tibiæ normal, truncate at apex **Emmenastus**

EURYMETOPON Esch.

In this genus the transverse metasternal groove is always deep and strongly developed, but becomes a little finer in section III. In this connection it should be stated that the relative length of the metasternum and first ventral segment, which is of considerable importance in separating the species, sometimes varies slightly with sex, the first segment being a little shorter in the female; this difference is however very insignificant, and does not affect the comparative measures as given in the table.

The antennæ are remarkably uniform in structure throughout, but have a slightly more abrupt and broader club in the subgenus *Cryptadius*. The elytra are often much wider at base than the contiguous base of the prothorax, a character unknown in *Emmenastus*.

The subgeneric sections may be defined as follows:—

Apical margin of the head entire; pronotal punctures coarse, deep and perforate, not at all scabrous or asperate **I**

Apical margin of the head with two small, widely distant emarginations.

Emarginations angulate and narrow, receiving the upper ridge of the mandibles; metasternum long; wings always well developed; pronotal punctures fine, shallow and slightly scabrous **II**

Emarginations broadly sinuate, not receiving the mandibles, the upper ridge of the latter finer, more external, less prominent dorsally and on a much lower plane than the margin of the epistoma; metasternum very short; hind wings completely obsolete; pronotal punctures slightly coarser, each puncture bounded externally by a fine acutely elevated longitudinal carina **III**

It will be noticed that these three subgenera differ not only in abruptly limited structural characters of unquestionable value, but also in general habitus, the punctuation, for example, especially of the pronotum, being of a distinctly different kind in each. The species are rather numerous and may be distinguished as follows:—

Section I.

EURYMETOPON Esch.

Metasternum between coxa and groove longer than the post-coxal portion of the first ventral segment ; wings well developed.

Metasternum very much longer than the first segment.

Elytra not more than three times as long as the prothorax.

Form elongate ; sides of the prothorax feebly arcuate ; elytra fully two-thirds longer than wide.....**rufipes**

Form broad and oblong ; prothorax more transverse, the sides strongly arcuate ; elytra not more than one-half longer than wide.

congener

Elytra nearly four times as long as the prothorax ; form slender and elongate**dubium**

Metasternum but slightly longer than the first segment, especially in the male.

Pronotum extremely coarsely, deeply perforate toward the sides, the punctures moderately coalescent ; form very strongly convex.

Larger species ; sides of the prothorax feebly arcuate...**perforatum**

Smaller, more slender and cylindrical ; sides of the prothorax strongly arcuate**emarginatum**

Pronotum more finely punctate and more distinctly rugulose laterally ; form more depressed, the pronotum more explanate laterally ; size small**fusculum**

Metasternum generally just visibly shorter than, sometimes subequal to, the first ventral segment ; form very convex, generally more oval ; wings more or less rudimentary.

Bicolored, ferruginous, the elytra black ; lustre rather dull**bicolor**

Unicolorous ; lustre generally much more shining.

Pronotum densely punctate, the punctures but slightly finer and sparser in the middle**convexicollis**

Pronotum finely, very sparsely punctate in the middle, very coarsely and more densely so laterally.

Elytra at base equal in width to the base of the prothorax.

cylindricum

Elytra at base distinctly wider than the base of the prothorax, the humeri exposed.....**politum**

Section II.

TELABIS n. subgen.

Metasternum nearly twice as long as the first segment ; elytra five times as long as the prothorax.....**longipenne**

Metasternum about one-half longer than the first segment.

Pronotum very densely punctate throughout the disk ; male with the fourth ventral segment lobed in the middle.....**punctulatum**

Pronotum sparsely punctate in the middle; male apparently without abdominal modification.

Elytra at base scarcely perceptibly wider than the contiguous base of the prothorax; disk of the pronotum without distinct impunctate line and otherwise unmodified **histricum**

Elytra at base much wider than the base of the prothorax, the humeri broadly exposed.

Pronotum with a narrow but entire median impunctate line, which is neither impressed nor elevated..... **muricatum**

Pronotum with a fine feebly impressed median line, which is not impunctate **discors**

Metasternum but very slightly longer than the first segment; small species.

Sides of the prothorax not distinctly serrulate.

Elytra at base very much wider than the base of the prothorax, the humeri broadly exposed; surface moderately convex..... **debile**

Elytral and thoracic bases equal in width; form very strongly convex.

Form oblong-oval, the elytra in the middle very much wider than the prothorax, the anterior angles of the latter very obtuse, not at all prominent **sodalis**

Form narrower and more cylindrical, the elytra in the middle but slightly wider than the prothorax, the anterior angles of the latter acute and prominent..... **crassulum**

Sides of the prothorax finely but rather strongly serrulate **serratum**

Section III.

CRYPTADIUS Lec.

Form broadly, evenly elliptical, strongly convex..... **inflatum**

The species published under the name *brevicollis* by Champion, apparently belongs to *Telabis*; it is the only described form not found within our faunal limits.

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Eu. rufipes Esch.—Zool. Atl. IV, p. 8; *abnorme* Lec.: Ann. Lyc. N. Y. V, p. 138.—Oblong-elongate, parallel, moderately convex, piceous to black, the legs and antennæ rufous and slightly paler; integuments polished, the elytra dull toward apex. *Head* short, very strongly transverse, broadly truncate at apex, coarsely, deeply, very densely and subconfluently punctate, usually with a small impunctate spot near the base of the occiput; eyes moderate, just visibly more prominent than the sides before them; antennæ long, moderately slender, third joint rather more than three times as long as wide, second about equal to the fifth, eighth longer than wide. *Prothorax* two-thirds wider than long, the apex slightly narrower than the base, very feebly emarginate in circular arc, the angles right and not at all rounded; base truncate, with a rather narrow and feeble rounded median lobe, on either side of which the edge is narrowly, feebly sinuate; basal angles slightly obtuse, not

at all rounded, not prominent; sides parallel and feebly arcuate, more convergent near the apex; disk coarsely, very deeply punctate, the punctures separated by about twice their diameters, rather abruptly extremely dense and longitudinally confluent in lateral fourth; edges margined with a very thin reflexed bead. *Elytra* equal in width to the prothorax and three times as long; sides parallel and nearly straight; apex obtusely ogival; disk coarsely punctate, more coarsely, very densely and slightly muricately so toward the sides, forming unimpressed series throughout the width, the punctures of the intervals as large as those of the series, confused toward the suture uniserial laterally, the lateral series almost attaining the apex. *Abdomen* finely, sparsely punctate; metasternum rather finely and very sparsely punctate, more coarsely, densely so laterally, fully one-half longer than the first ventral segment, the transverse interrupted groove deeply impressed. *Legs* slender. Length 7.2-8.5 mm.; width 3.0-3.5 mm.

California (San Bernardino and The Needles).

This is the form which has been regarded as *rufipes* and agrees with the description of Eschscholtz, but I have never taken it near San Francisco, which is the locality assigned it in the original diagnosis, and do not think that it occurs there. In all probability it belongs exclusively to the fauna of southern California.

Eu. congener n. sp.—Form oblong, parallel, very broad, rather strongly convex, piceous-black; legs and antennae dark rufous; integuments polished, the elytra alutaceous toward apex. *Head* moderate, strongly transverse, broadly truncate at apex, rather coarsely, moderately densely punctate, the punctures circular and rather widely separated, not in the least coalescent; eyes moderate, not prominent, the upper folds acute and strongly cariniform; antennae as in *rufipes* but relatively longer. *Prothorax* from three-fourths to five-sixths wider than long, nearly as in *rufipes* but with the sides more strongly arcuate and the punctuation coarser, sparse toward the middle, densely crowded, tending to coalesce and very coarse near the sides. *Elytra* one-half longer than wide, nearly three times as long as the prothorax, very abruptly and broadly ogival at apex; sides parallel and nearly straight; disk slightly wider than the pronotum, punctured nearly as in *rufipes* but more coarsely. *Abdomen* rather coarsely, deeply, moderately densely punctate throughout; metasternum fully one-half longer than the first ventral segment, rather coarsely, deeply punctate, sparsely so toward the middle, very densely laterally. *Legs* slender. Length 7.0-7.5 mm.; width 3.2-3.4 mm.

Texas (El Paso). Mr. Dunn.

Resembles *rufipes* in general characters, but differs in its very distinctly shorter and broader form, shorter and more strongly rounded prothorax and coarser punctuation. It very closely resembles *convexicolle*, but differs in its well-developed wings which are

as long as the elytra, the longer metasternum and free elytra. The three specimens do not indicate any great variation.

Eu. dubium Casey.—Cont. Descr. Col. N. A., I, p. 44; *carbonatum* Cas.; l. c., p. 43.—Elongate, parallel, convex, polished, the elytra dull toward apex, intense black; legs and antennæ dark rufous. *Head* nearly as in *rufipes*, the punctures not quite so dense; antennæ slender, the third joint three times as long as wide, second distinctly shorter and more robust than the fifth. *Prothorax* nearly as in *rufipes*, the punctures toward the sides not quite so coalescent and also distinctly sparser toward the middle, the disk more transverse, fully three-fourths wider than long. *Elytra* usually distinctly wider than the prothorax and nearly four times as long; sides parallel and nearly straight, punctured nearly as in *rufipes*. Length 7.6–8.5 mm.; width 2.8–3.4 mm.

Arizona. Mr. Morrison.

This species, while allied to *rufipes*, differs in its slightly narrower form, and especially in the relatively smaller, more transverse prothorax and longer elytra. The prothorax varies considerably in size and convexity.

Eu. perforatum n. sp.—Oblong-elongate, parallel, strongly convex, shining, intense black throughout; legs piceous; antennæ dark rufous. *Head* short, rather strongly transverse, very coarsely, densely cribrate, the punctures circular and generally narrowly separated, not longitudinally confluent; apex transversely truncate, entire; eyes moderate; antennæ slender, the third joint about two and one-half times as long as wide, generally but very slightly longer than the fourth. *Prothorax* from three-fifths to two-thirds wider than long; apex about five-sixths as wide as the base, evenly, feebly but distinctly emarginate in circular arc, the angles right, not at all rounded and generally slightly prominent, the sides behind them being very broadly, feebly sinuate; base transverse, very distinctly sinuate for a short distance at each side of the narrow feeble median lobe; basal angles right, not rounded and just visibly prominent; sides very feebly arcuate, straight in basal half, convergent anteriorly; disk very slightly wider in the middle than at base, very coarsely, deeply perforate, the punctures well separated near the middle but gradually extremely dense and more or less longitudinally coalescent laterally. *Elytra* just visibly wider than the prothorax and three times as long; sides parallel and nearly straight, broadly ogival at apex; disk very coarsely, deeply punctate in very approximate series near the sides, more sparsely, finely and irregularly near the suture. *Abdomen* rather finely, sparsely punctate, the last segment densely cribrate as in *rufipes*; metasternum moderately long, coarsely, sparsely punctate. *Legs* long, the posterior tarsi distinctly shorter than the tibiae. Length 6.5–7.7 mm.; width 2.6–3.2 mm.

Arizona.

Allied to *rufipes* and replacing that species in the mountainous regions of southern Arizona; the series of fourteen specimens is

quite homogeneous. *Perforatum* is almost similar in outline to *rufipes* but differs in its smaller size, greater convexity, very much coarser and more cribrate punctuation, more prominent thoracic angles and shorter third antennal joint. The elytral series are very slightly impressed especially toward the suture, this feature being feebly apparent also in several other species.

Eu. emarginatum Casey.—Cont. Descr. Col. N. A., I, p. 41; *piceum*, *papagonum* and *sculptile* Cas.: I. c., pp. 40–45.—Elongate, parallel, very convex and subcylindrical, polished except near the apex, black, sometimes pale ferruginous from immaturity; legs and antennæ dark rufous. *Head* relatively large, nearly three-fourths as wide as the prothorax, somewhat coarsely, densely punctate; antennæ rather robust, shorter than usual. *Prothorax* about two-thirds wider than long, strongly convex, evenly and strongly arcuate at the sides, very coarsely, deeply punctate, the punctures sparse toward the middle, very densely crowded and longitudinally coalescent laterally. *Elytra* subequal in width to the prothorax and about three times as long, rather obtusely to acutely ogival at apex; sides parallel and nearly straight; disk coarsely, deeply punctate, the punctures forming approximate series toward the sides. *Abdomen* very feebly alutaceous, more or less finely, sparsely but distinctly punctate; metasternum rather short, a little longer than the first ventral segment. *Legs* rather short and robust, the posterior tarsi very distinctly shorter than the tibiae. Length 5.9–6.2 mm.; width 2.2–2.5 mm.

Arizona. Mr. Morrison.

A small subcylindrical species, allied in structural characters to *perforatum*, but differing greatly in appearance. The types of *sculptile* and *papagonum* are distinctly narrower, more slender and more depressed than those of *emarginatum* and *piceum*, the difference being sexual. In *sculptile* the surface is very dull throughout, the type being apparently an abnormal specimen.

Eu. fuscum n. sp.—Oblong-elongate, parallel, rather strongly convex, polished, dark rufo-castaneous throughout. *Head* moderate, transverse, broadly, evenly truncate at apex, moderately coarsely, deeply, densely, somewhat unevenly punctate and subrugulose; eyes and superior folds well developed; antennæ moderate, the third joint nearly three times as long as wide. *Prothorax* nearly four-fifths wider than long, the apex slightly narrower than the base, broadly, very feebly emarginate in circular arc, the angles very slightly obtuse but not in the least blunt; base transverse, very feebly sinuate at each side of the middle, the angles distinctly obtuse but not at all rounded; sides evenly and rather strongly arcuate throughout; disk very convex, deeply punctate, the punctures not very coarse, rather sparse except near the sides where they are but slightly coarser, very densely crowded and longitudinally coalescent. *Elytra* subequal in width to the prothorax and rather more than

three times as long, punctured nearly as in *rufipes*, all the punctures very fine and sparse toward the suture where the striae are extremely feebly subimpressed, the punctures much coarser, denser and strongly asperate laterally. *Abdomen* finely, sparsely punctate. *Legs* long and slender, the posterior tarsi slightly shorter than the tibiae. Length 6.0-6.7 mm.; width 2.5-2.8 mm.

Arizona.

Although belonging to the *rufipes* section of the genus, this species is not allied very closely to any other, and in some characters is intermediate between that group and *convexicolle*. The metasternum is much shorter than in *dubium* or *rufipes*, but longer than in *convexicolle*, the distance from the posterior margin of the coxa to the transverse groove being but slightly greater than the length of the first ventral segment, while in the species mentioned it is fully one-half longer than the segment. The pronotal punctation is finer than usual in this section of the genus, and the size is much smaller.

Eu. bicolor Horn.—Trans. Am. Phil. Soc., XIV, p. 268.—Oblong-oval, strongly convex, rather feebly shining and alutaceous, piceous-black; head, pronotum, sterna, legs and antennae paler, rufo-ferruginous. *Head* very short and transverse, strongly narrowed from base to apex, the latter more than usually narrowly truncate or extremely feebly sinuate; surface coarsely, very densely punctate, a spot near the base of the occiput usually impunctate; antennae rather short and robust. *Prothorax* about four-fifths wider than long, the apex scarcely more than four-fifths as wide as the base, feebly emarginate in circular arc, the angles slightly obtuse but not at all rounded; base truncate, feebly sinuate for a short distance at each side of the middle; basal angles slightly acute, not in the least rounded and just visibly prominent; sides parallel and very feebly arcuate, then strongly convergent and more strongly arcuate in apical third; disk rather coarsely, deeply, somewhat sparsely punctate toward the middle, much more coarsely, extremely densely but not very confluent so laterally. *Elytra* scarcely three times as long as the prothorax and, behind the middle, nearly one-fifth wider; sides rather strongly arcuate; apex broadly, very obtusely ogival; disk not very coarsely, rather feebly punctate, somewhat confusedly near the suture, in approximate and more asperate series laterally. *Abdomen* finely, feebly, sparsely punctate, more coarsely, densely so laterally; metasternum just visibly longer than the first ventral segment. *Legs* moderate, the posterior tarsi unusually short, scarcely two-thirds as long as the tibiae. Length 6.5 mm.; width 3.2 mm.

Arizona.

The elytra are unusually inflated and the species may be readily distinguished from any other by its convex form, alutaceous lustre and peculiar coloration.

Eu. convexicollis Lec.—Ann. Lyc. N. Y., V, p. 139.—Oblong-oval, strongly convex, piceous-black, sometimes paler, shining. *Head* moderately transverse, coarsely, deeply, perforately punctate, the punctures rather dense but not contiguous; apex truncate, entire; eyes moderate, very slightly more prominent than the sides before them, the superior folds advancing well beyond them and strongly arcuate; antennæ rather slender, the third joint fully three times as long as wide and much longer than the fourth. *Prothorax* from four, to nearly five-fifths wider than long, the apex about five-sixths as wide as the base, very feebly emarginate, the angles right and not blunt; base transversely truncate, broadly, very feebly sinuate at each side of the middle, the basal angles broadly obtuse but not at all rounded; sides distinctly arcuate, more convergent and straighter toward apex; disk coarsely, deeply punctured throughout, the punctures toward the sides gradually very closely crowded and longitudinally confluent, but not much larger than those toward the middle where they are usually separated by from once to twice their own diameters. *Elytra* usually very slightly wider than the prothorax and rather more than three times as long, generally about one-half longer than wide; sides very feebly arcuate; apex obtusely ogival; disk rather finely, sparsely and irregularly punctate toward the suture, but much more coarsely and asperately so laterally where the punctures are arranged in approximate series, especially coarse and dense toward the humeri. *Abdomen* finely, sparsely punctured; metasternum from coxa to impressed groove just visibly shorter than the first ventral segment. *Legs* moderate, rather robust, the posterior tarsi much shorter than the tibiae. Length 6.4–7.5 mm.; width 2.8–3.3 mm.

California (Barstow, San Bernardino and the Colorado Desert).

The series of eleven specimens exhibits considerable variation, not only in color but in general form, but is not sufficiently extensive to enable me to define any distinct varieties; the species may be readily known by its robust, convex form, strongly transverse and densely, very coarsely punctured pronotum. The hind wings are by no means obsolete, although rudimentary; they are broad, hyaline and about two-thirds as long as the elytra, the latter subconnate.

Eu. cylindricum n. sp.—Elongate, parallel, very strongly, cylindrically convex, shining, the head very dull, black to piceous throughout. *Head* transverse, truncate, generally finely and decidedly sparsely punctate, the punctures sometimes rather coarse but always distant; eyes moderate, the fold very acute, long and feebly arcuate; antennæ rather slender, the third joint but slightly more than twice as long as wide and only slightly longer than the third. *Prothorax* from two-thirds to four-fifths wider than long, the apex very feebly incurvate, the angles right and not at all blunt, the base transverse, the two median sinuations very feeble; basal angles slightly obtuse, not at all rounded and frequently very slightly prominent; sides parallel and very feebly arcuate, more convergent and straighter in apical

half; disk very finely, feebly and sparsely punctate, except very abruptly in lateral fourth, where the punctures become extremely coarse and deep, elongate-oval and not very coalescent. *Elytra* equal in width to the prothorax and about three times as long; sides parallel and nearly straight; apex obtusely ogival; disk punctured nearly as in *convexicollis* but more coarsely, less densely and less asperately so laterally, and still more finely and sparsely so toward the suture. *Abdomen* finely, sparsely punctate, the metasternum from coxa to transverse groove distinctly shorter than the first ventral segment. *Legs* slender. Length 6.5-7.5 mm.; width 2.7-3.4 mm.

California (Kern Co.).

This species is represented by a large series and cannot fail to be easily recognized by the very peculiar punctuation of the pronotum, subcylindrical form and more than usually elongate prothorax. The punctures toward the sides of the pronotum are very abruptly five or six times as large as those of the broad median portion, the latter being very sparse as well as fine.

Eu. politum n. sp.—Elongate-oval, strongly convex, castaneous, highly polished, feebly alutaceous toward the apex of the elytra. *Head* moderately transverse, shining, entire and broadly truncate at apex, rather finely and densely punctate, the punctures distinctly separated; eyes moderate, the superior fold distinct, strongly arcuate in front of the eye; antennæ slender, third joint fully three times as long as wide, much longer than the fourth, second elongate. *Prothorax* fully three-fourths wider than long, the apex distinctly narrower than the base, just visibly emarginate, the angles slightly obtuse but not in the least rounded; base transverse, with the usual feeble median sinuations; basal angles obtuse, the apex rather acute, not in the least rounded and just perceptibly prominent; sides evenly and strongly arcuate throughout; disk much wider in the middle than at base, convex, rather finely and sparsely punctate, the punctures gradually becoming coarser, about twice as large and dense but not coalescent toward the sides. *Elytra* slightly wider than the prothorax and a little more than three times as long, gradually rather acutely rounded behind; sides parallel and feebly arcuate; width across the humeri, which are narrowly rounded and not prominent, quite distinctly greater than the base of the prothorax; disk convex, finely, rather irregularly and sparsely punctured toward the suture, the punctures very coarse and forming approximate series laterally where they are not perceptibly asperate, except feebly so toward apex. *Abdomen* rather finely but strongly, sparsely punctate, the metasternum between coxa and groove equal in length to the first ventral segment. *Legs* slender, the femora rather robust, polished, very minutely and extremely sparsely punctate; posterior tarsi long and slender, slightly shorter than the tibiae. Length 6.5 mm.; width 2.8 mm.

Texas (El Paso).

The single specimen which I took in loose sand, at the roots of

some slender perennial plants growing near the banks of the Rio Grande, represents a species which cannot well be compared with any other here described. It is narrower and much more sparsely punctate than *convexicolle*, and moreover differs from both that species and *cylindricum* in the much broader elytral base, with exposed humeri, and in its shining head; in the two species mentioned the head is more transverse, and is rendered very dull by a peculiar system of excessively minute but strong granuliform reticulations; in *politum* the reticulations are flat and much larger. The metasternum in *politum* is slightly longer than in *convexicolle*.

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Eu. longipenne n. sp.—Oblong-elongate, parallel, moderately convex, piceous-black; under surface anteriorly, legs and antennæ dark rufous; integuments subalutaceous. *Head* short and very transverse, broadly, arcuately impressed anteriorly, the sides before the eyes rounded and broadly, feebly reflexed, the epistoma transversely, feebly tumid and very broadly arcuate between the emarginations which are broadly angulate and feeble; surface finely, densely punctate, the punctures shallow, annular and scabrous; eyes rather large, feebly prominent, the upper fold very short; antennæ slender, the third joint very elongate. *Prothorax* fully twice as wide as long, the apex slightly narrower than the base, evenly, rather strongly emarginate in circular arc, the angles acute and distinctly prominent; base transverse, with the usual two feeble approximate sinuations; basal angles right, slightly everted and distinctly prominent; sides very distinctly, rather evenly arcuate; disk distinctly wider behind the middle than at base, rather finely but distinctly, very densely punctate, without trace of median line, the punctures scabrous, extremely dense and crowded laterally, the marginal bead very acute and strongly elevated. *Elytra* about one-fourth wider than the prothorax and about five times as long, wider across the humeri than any portion of the prothorax, the humeri narrowly rounded; apex obtusely rounded; sides straight and parallel; disk with distant and indistinct series of small feeble punctures, the series broadly, feebly and unevenly impressed; intervals very minutely, sparsely punctate. *Abdomen* feebly, the metasternum very finely and sparsely punctate, the latter polished and nearly twice as long as the first ventral segment. *Legs* long and slender. Length 9.2 mm.; width 3.5 mm.

New Mexico.

This well-marked species is the largest of the genus yet described, and is very distinct in its long elytra, short prothorax, long metasternum and several other characters. The anterior tibiæ are strongly, unevenly serrato-crenulate along the outer edge, and the disk of the pronotum is very feebly impressed and more sparsely punctate just before the scutellum.

Eu. punctulatum Lec.—New Spec. Col., 1866, p. 105.—Oblong-oval, rather depressed, dark rufo-ferruginous throughout; integuments thin, rather smooth but very dull; wings well developed. *Head* strongly transverse, narrowed from base to apex, finely, very densely punctate, truncate at apex and with two small distant emarginations; eyes rather large and distinctly more prominent than the sides before them; antennæ slender, slightly longer in the male, the second joint elongate, scarcely more than one-half as long as the third and much shorter than the fourth, second joint in the female fully three-fourths as long as the third and very nearly as long as the fourth. *Prothorax* from four to five-fifths wider than long, the apex distinctly narrower than the base, feebly but distinctly emarginate in circular arc, the angles obtuse but not rounded and subprominent; base transverse, very feebly bisinuate in the middle; basal angles very obtuse but not distinctly blunt; sides strongly arcuate in the middle, feebly convergent and very feebly arcuate thence to the base, more strongly convergent and straight or very broadly sinuate in apical third; disk distinctly wider in the middle than at base, finely, rather feebly, submuricately and very densely punctate throughout, with a very narrow and imperfect median impunctate line, the punctures slightly coarser laterally. *Elytra* from one-fifth to one-third wider than the prothorax and four times as long, distinctly wider at base than the thoracic base, the humeri exposed, narrowly rounded; sides parallel and nearly straight; disk very finely, feebly, submuricately punctate, the punctures with extremely feebly defined serial arrangement. *Abdomen* excessively minutely, sparsely punctate; metasternum more coarsely punctate, between coxa and groove nearly one-half longer than the first ventral segment. *Legs* long and slender. Length 6.4–7.5 mm.; width 3.0–3.2 mm.

Lower California (Cape San Lucas). Cab. LeConte.

In its distinct male sexual characters this species, so far as known, stands alone; the male is larger than the female, more parallel, with longer antennæ, and has the apex of the fourth ventral segment produced in the middle in a small feebly reflexed strongly rounded lobe, extending slightly over the fifth. Although the elytra have but slight traces of serial punctuation, the series are often indicated as broad dark streaks, due to the interference of light and the coarse cellular structure of the inferior surface. Superficially, *punctulatum* may be readily known by its very dull lustre and extremely dense, almost even, pronotal punctuation.

Eu. histricum n. sp.—Oblong, parallel, rather strongly convex, piceo-castaneous, slightly paler and more rufous beneath; integuments distinctly alutaceous. *Head* short and very transverse, narrowed from base to apex, finely, not very densely punctate, extremely densely so on the epistoma; apex truncate, the lateral emarginations very feeble, the lateral oblique sutures however distinctly impressed; eyes moderate, rather prominent, the superior fold very strongly arcuate and almost attaining the lateral margin;

antennæ slender, the third joint very elongate. *Prothorax* three-fourths to four-fifths wider than long, the apex slightly narrower than the base, evenly but feebly emarginate, the angles rather acute and prominent; base transverse, feebly bisinuate in the middle, the basal angles slightly obtuse, not in the least rounded; sides rather strongly, evenly arcuate, more convergent and straighter near the apex; disk feebly, transversely impressed just before the base, rather longitudinally convex, somewhat finely but strongly, sparsely punctate, the punctures becoming gradually coarser, scabrous and extremely densely crowded laterally. *Elytra* slightly but distinctly wider than the prothorax and about three and one-half times as long, at base but just visibly wider than the contiguous base of the latter, the humeri very slightly exposed, obtusely subangulate; apex broadly, obtusely rounded; sides parallel and straight, feebly convergent and arcuate toward the humeri; disk with distant and somewhat uneven unimpressed series of punctures, the latter very fine and not very close-set near the suture, but becoming coarse, rather scabrous, extremely approximate and more irregularly placed toward the sides and especially toward the humeri; intervals more finely, sparsely and very feebly punctate. *Abdomen* finely punctate; metasternum very densely punctate laterally, fully one-half longer than the first ventral segment. *Legs* slender. Length 7.3-7.7 mm.; width 3.2 mm.

Arizona.

This species is to be placed near *muricatum*, but differs greatly in its more robust and convex form, alutaceous lustre and very much denser, coarser and more coalescent punctuation toward the sides of the body. The lateral emarginations of the epistoma are very feeble; they are normally developed in *muricatum*.

Eu. muricatum n. sp.—Oblong, elongate, subparallel, moderately convex, shining, piceous-black; under surface, legs and antennæ dark rufous. *Head* short and transverse, narrowed from base to apex, the latter truncate and with two very feeble distant emarginations; surface finely, rather feebly, somewhat densely and submuricately punctate; eyes moderate, rather distinctly prominent; antennæ long and slender, the third joint very elongate, the fourth shorter. *Prothorax* three-fourths to four-fifths wider than long; apex slightly narrower than the base, feebly, evenly but distinctly emarginate, the angles not at all rounded, slightly obtuse when viewed laterally but acute and prominent vertically; base transverse, with the two approximate median sinuations rather pronounced; basal angles obtuse, not rounded; sides moderately arcuate, more convergent anteriorly; disk a little wider slightly behind the middle than at base, very finely, sparsely punctate, with a narrow impunctate line, the punctures becoming gradually coarser and muricate but still small and rather well separated laterally. *Elytra* somewhat distinctly wider than the prothorax and four times as long or slightly less; humeri exposed, obtuse but not rounded; sides parallel and feebly arcuate, rather obtusely rounded at apex; disk with distant series of small, approxi-

mate, submuricate punctures, the series sometimes very feebly impressed; intervals very finely, sparsely punctate throughout the width. *Abdomen* excessively minutely, feebly punctate; metasternum a little more coarsely so, nearly one-half longer than the first ventral segment. *Legs* long and slender, the posterior tarsi distinctly shorter than the tibiae. Length 6.6–7.2 mm.; width 2.7–3.2 mm.

Arizona (Benson). Mr. Dunn.

This species, which is represented by a good series, is allied only to *histricum*, but is more slender and much more polished. A portion of the series was communicated by Mr. Dunn as having been taken at El Paso, Texas, but I am inclined to think that they were all taken at the locality indicated. The sexual characters are not distinctly pronounced.

Eu. discors n. sp.—Oblong-elongate, parallel, moderately convex, rather shining, castaneous throughout; integuments thin; wings well developed. *Head* nearly as in *longipenne*, but less impressed and with the broad, indefinite, transverse tumidity of the epistoma more acute and cariniform. *Prothorax* just visibly less than twice as wide as long, the apex much narrower than the base, moderately emarginate, the angles right, not rounded and slightly prominent; base truncate, feebly bisinuate in the middle, the basal angles very broadly obtuse but with the extreme apex right and slightly prominent, the sides before them broadly and very feebly sinuate; sides very strongly arcuate and strongly convergent toward base and apex; disk much wider at or a little behind the middle than at base, very obsoletely impressed just before the scutellum and with a feeble impressed median line; punctures scabrous, rather fine and decidedly sparse toward the middle, coarser, much denser but still not very crowded laterally; marginal bead moderate in elevation, very thin, the outer edge very finely and feebly serrulate especially anteriorly. *Elytra* but very slightly wider than the prothorax and between four and five times as long, across the humeri about equal to it in width, and much wider than its base, the humeri narrowly rounded; apex broadly, obtusely rounded; sides parallel and subrectilinear; disk with series of broad, very feeble, impressed sulcations and equally wide intervals, very finely, not very densely, subasperately punctate throughout, with vaguely defined series along the middle of the sulci. *Abdomen* extremely minutely, the metasternum finely but distinctly, rather sparsely, punctate, the latter between coxa and groove scarcely one-half longer than the first ventral segment; ventral segments long. Length 6.7–7.8 mm.; width 2.8–3.2 mm.

Texas (El Paso).

The peculiar feeble sulcation of the elytra is similar to that of *longipenne*, but more pronounced; on the other hand, however, the series of punctures are much less definite than in that species. *Discors* is related to *longipenne*, but differs in the much more

arcuate sides of the prothorax, sparser punctuation, smaller size, relatively narrower and shorter elytra, much shorter metasternum, and in the presence of an impressed median line on the pronotum; this line is very feeble and may sometimes be scarcely traceable. There is no trace of an impunctate median line in either *discors* or *longipenne*.

Eu. debile n. sp.—Oblong-oval, moderately convex, piceous-black, the legs and antennæ dark rufous; integuments rather dull, the elytra more shining. *Head* moderately narrowed from base to apex, the sides before the eyes feebly arcuate; median lobe at apex very slightly produced, broadly truncate, the emarginations very small but distinct; eyes moderate; surface finely, extremely densely punctate throughout; antennæ slender. *Prothorax* about three-fourths wider than long; apex slightly narrower than the base, evenly and strongly emarginate in circular arc, the angles right, not at all rounded and anteriorly prominent; base transverse, extremely feebly sinuate at each side of the middle; basal angles rather obtuse but not at all rounded; sides nearly evenly and moderately arcuate; disk rather convex longitudinally, with the feeblest trace of a fine, elevated, median line, finely, densely punctate, the punctures scabrous and extremely densely crowded toward the sides, very dense but distinctly separated toward the middle, not at all impressed although very sparsely punctate in a small area opposite the scutellum. *Elytra* nearly one-fourth wider than the prothorax and rather more than three times as long, across the humeri a little wider than any portion of the disk of the latter, the humeri broadly exposed and very narrowly rounded; apex obtusely rounded; sides parallel and nearly straight; disk with extremely confused, approximate, unimpressed rows of somewhat coarse, subscabrous and rather approximate punctures. *Abdomen* very finely and sparsely punctate; metasternum between coxa and groove nearly one-fourth longer than the first ventral segment. *Legs* slender, the posterior tarsi much shorter than the corresponding tibiae. Length 5.6 mm.; width 2.5 mm.

Arizona (Peach Springs). Mr. Wickham.

This distinct species is allied to *punctulatum* and *longipenne*, but is very much smaller; from *crassulum* and *sodalis* it may be readily known by its widely exposed humeri and more depressed form. It is a connecting link between the larger species of this section, with very long metasternum, and the small very convex species with shorter metasternum.

Eu. sodalis Horn.—Trans. Am. Phil. Soc., XIV, p. 268.—Oblong-oval, robust, very convex, subalutaceous, the elytra polished, pale brownish-testaceous throughout. *Head* rather small, moderately transverse, narrowed from base to apex, the latter truncate, the median lobe extremely broad, very slightly advanced, broadly rounded toward the emarginations which are dis-

tinct; lateral lobes narrow, very narrowly rounded at apex, the sides nearly straight thence to the eyes, the latter moderate, scarcely visibly prominent; surface rather finely, extremely densely punctate and scabrous, not transversely tumid anteriorly, the sides not reflexed; antennæ moderate, the third joint elongate. *Prothorax* nearly twice as wide as the head, very nearly twice as wide as long, the apex slightly narrower than the base, extremely feebly, evenly emarginate in circular arc, the angles obtuse, not rounded but not in the least prominent; base transverse, the two median sinuations almost obsolete; basal angles very broadly obtuse and narrowly rounded; sides rather strongly and evenly arcuate; disk slightly behind the middle distinctly wider than at base, rather finely and feebly punctate, the punctures scabrous, extremely densely crowded laterally, slightly separated toward the middle, without trace of median line; along the basal margin there is a rather thick bead. *Elytra* about one-fourth wider than the prothorax and nearly four times as long, at base equal in width to the base of the latter, the humeri not exposed; apex broadly, obtusely rounded; sides subparallel and feebly arcuate; disk very convex, with ill-defined rows of small but deep punctures; intervals finely, confusedly punctate; punctures much smaller and feebler toward the suture, not distinctly asperate laterally. *Abdomen* very finely rather sparsely punctate; metasternum between coxa and groove just visibly longer than the first ventral segment. *Legs* slender, moderate in length. Length 5.4 mm.; width 2.7 mm.

California (Owen's Valley). Cab. Horn and LeConte.

A rather small species, remarkable for its somewhat robust, compact, very convex form and broadly obtuse thoracic angles.

Eu. crassulum n. sp.—Oblong-oval, very convex, subalutaceous; castaneous to piceous-black; legs and antennæ dark rufous. *Head* rather large, moderately transverse; sides nearly straight and strongly convergent from base to apex, the eyes moderately prominent; median lobe of apex truncate, very slightly produced, moderate in width, the lateral lobes moderate in width and not reflexed at the sides; surface even, rather finely, very densely punctate and scabrous; antennæ rather short but slender, the third joint elongate. *Prothorax* scarcely two-thirds wider than the head, rather less than twice as wide as long, the apex much narrower than the base, evenly and very distinctly emarginate, the angles right, not at all rounded and distinctly prominent anteriorly; base transverse, with two feeble median sinuations; basal angles obtuse but not in the least rounded; sides rather strongly arcuate; disk much wider behind the middle than at base, finely but distinctly punctate, the punctures scabrous, very densely crowded laterally, slightly separated toward the middle; transverse basal bead distinct. *Elytra* but very slightly wider than the prothorax and slightly more than three times as long, at base equal in width to the base of the latter; apex broadly rounded; sides very feebly arcuate, parallel; disk very densely punctate, the punctures rather distinctly asperate, arranged in approximate, moderately defined series

toward the sides. Metasternum between coxa and groove slightly longer than the first ventral segment; wings well developed. Length 4.7-5.3 mm.; width 2.1-2.3 mm.

Texas (El Paso); Arizona.

This species, which is represented before me by an ample series, is one of the smallest of the genus and is remarkable for its very convex, subcylindrical form and dense punctuation. It differs from *sodalis*, to which it is allied, in its much smaller size and narrower form, larger head which is more strongly narrowed from base to apex, in its denser duller and darker integuments, and prominent thoracic angles. The median lobe of the front is narrower and the lateral lobes much broader than in *sodalis*.

In these small species the basal bead of the pronotum and its corresponding fine groove are more pronounced than in the others.

Eu. serratum Lec.—New Spec. Col., 1866, p. 106.—Elongate-oval, very strongly convex, pale brownish-testaceous throughout, polished. Head moderately narrowed from base to apex; sides straight; median lobe of apex slightly produced, truncate; lateral emarginations distinct; eyes large and slightly prominent; antennae long and very slender; surface finely and rather sparsely punctate. Prothorax about two-thirds wider than the head and twice as wide as long; apex considerably narrower than the base, evenly and distinctly emarginate in circular arc, the angles obtuse, not at all rounded but not very prominent; base transverse, very feebly lobed in the middle, the basal angles extremely obtuse and rather blunt; sides strongly arcuate, straighter and more convergent toward apex; disk much wider behind the middle than at base, with obsolete traces of a fine elevated median line and a small foveiform impression just before the scutellum, rather coarsely but feebly and roughly punctate laterally, the punctures slightly separated, finer and decidedly sparse toward the middle; lateral edges finely but distinctly serrulate and with short erect setae. Elytra slightly wider than the prothorax and rather less than four times as long; humeri but slightly exposed, rounded; apex parabolically rounded; sides feebly arcuate; disk with rather well defined, unimpressed, approximate rows of punctures, the latter becoming finer, sparser and more diffused toward the suture; punctures distant throughout in the rows. Metasternum between coxa and groove about one-fourth longer than the first ventral segment. Legs very slender throughout, the posterior tarsi subequal in length to the tibiae. Length 4.4-5.0 mm.; width 2.0-2.2 mm.

Arizona (Gila Valley); Texas (El Paso).

As usual throughout this section of the genus the anterior tibiae are finely serrato-crenulate externally. One specimen in the cabinet of Dr. LeConte, marked "Atlanta, Idaho," and probably collected by Mr. L. Allgewahr, indicates a very exceptional range for this

genus. Other specimens from Holbrook and Albuquerque, New Mexico, appear to represent a distinct variety with denser piceous integuments, denser punctuation and slightly larger size, with shorter posterior tarsi, the metasternum being equal in length to the first ventral segment.

Eu. inflatum Lec.—*Cryptadius inflat.*: Ann. Lyc. N. Y., V, p. 140.—Broadly, evenly elliptical, strongly convex, rather shining, piceous-black, sometimes pale from immaturity; under surface, legs and antennæ dark rufous. *Head* moderately transverse, coarsely, somewhat sparsely punctate, the punctures carinate outwardly; eyes moderate, very slightly prominent, the fold strongly cariniform, strongly arcuate before them; apex broadly transverse, remotely bisinuate, middle lobe broadly arcuate; antennæ long but somewhat robust, rather strongly clavate, the tenth joint distinctly wider than long. *Prothorax* nearly two and one-half times wider than long, the apex scarcely more than two-thirds as wide as the base, evenly, strongly emarginate in circular arc, the angles slightly obtuse, a little blunt but very pronounced; base transverse, feebly and anteriorly oblique and slightly arcuate toward the basal angles, which are obtuse and distinctly rounded; sides very strongly convergent from base to apex, evenly and moderately arcuate; disk rather coarsely punctate, the punctures simple and slightly separated toward the middle, denser, coarser and externally cariniferous laterally, widest slightly before the base. *Elytra* about one-fifth wider than the prothorax and three times as long, at base truncate and fully as wide as the disk of the latter, rather acutely angulate at apex; sides parallel and feebly arcuate in basal two-thirds; disk evenly and almost equally punctate throughout without trace of series, the punctures moderate in size, rather dense and distinctly granuliform. *Abdomen* very finely, sparsely punctate; metasternum very short, between coxa and groove but slightly more than one-half as long as the first ventral segment; epipleuræ dilated at base, very wide. *Legs* long and slender, the posterior tarsi slightly shorter than the corresponding tibiae which are very slender and feebly arcuate throughout the length. Length 6.5–7.0 mm.; width 3.6–4.0 mm.

California (San Diego).

A most interesting and aberrant species which is very certainly entitled to subgeneric distinction, the characters relating to the front as given in the table differing from those of *Telabis* to a remarkable degree.

In two of the specimens before me, which are perfectly black, there are no traces whatever of serial arrangement of the elytral punctures, but in three others, which are uniformly pale ferruginous, there are very feebly defined lateral series in which the punctures are more densely but irregularly aggregated. Although there

are, practically speaking, no distinct series, the elytra bear distinct traces of the very feeble longitudinal impressed lines, so often noticeable throughout the *Epitragini*.

Undetermined Species.

Eu. ochraceum Esch.

The description of *Mannerheim* is as follows:—

“Oblongum, pallide ochraceum, capite paulo obscuriore, thorace subcylindrico, elytris medio gibbosis posterius declivibus, subtiliter striato-punctatis, punctis basi et apice evanescentibus, interstitiis remote punctulatis, punctis subseriatis.

“Longit. $1\frac{1}{4}$ lin.

“Habitat in California ad St. Franzisco, sub lapidibus.”

If this description is correct it cannot refer to any known species of *Eurymetopon*. The length as given indicates a very small species, smaller than the smallest known specimen of *Emmenastus*, and in the latter genus the elytral punctures, although frequently feebler or evanescent near the apex, are never so to the least degree toward base; they are on the contrary almost invariably stronger toward base especially near the humeri.

EMMENASTUS Mots.

The genus *Emmenastus*, in its present scope, is one of the most composite of the *Tenebrionidæ*. The sections may be thus defined:—

Antennæ long and slender, the eighth joint always distinctly longer than wide; eyes large or moderate, sometimes prominent.

Tarsi sparsely clothed beneath with short spinose setæ.

Wings well developed**I**

Wings completely obsolete.....**II**

Tarsi densely clothed with long, coarse, yellow pubescence; wings wanting**III**

Antennæ short and robust, much more compact, the eighth joint never longer than wide; wings present but extremely rudimentary; eyes much smaller, never at all prominent**IV**

It will be readily observed that these sections are of more than usual importance, and if not generic are at least entitled to full subgeneric recognition. I have not given them distinctive names, however, as the very extensive Mexican contingent will probably add several others, and the mutual relationship and limitation of

the various subgenera can be adequately appreciated only in a general monograph.

The metasternum¹ is usually longer in those species having well-developed wings, but this difference is not always very pronounced. The metasternal groove is as usual widely interrupted opposite the abdominal process and becomes obliterated before attaining the episterna. This groove has but little definite systematic value in *Emmenastus* other than specific. In section I it is always very strong and well developed, also in the single representative of section III, while in section II it is well marked in some species and more or less rudimentary in others, and, although in section IV it is generally almost obsolete, its tendency to appear is frequently indicated by a feebly impressed line of close irregularly placed punctures.

The sections as defined above are quite homogeneous with the exception of II, which is still rather composite although in characters of minor value, the individual species being in every instance widely isolated; they are much more persistent in type in sections I and IV. In section IV the hind wings appear to be constantly present but are always very rudimentary; in *obesus*, for example, they consist of an extremely small semi-membranous plate, scarcely more than one-fourth as long as the prothorax, and in *ater* of a very slender fillet of similar structure about as long as the prothorax. In this section the apical margin of the head is not truncate but broadly, more or less evenly arcuate and entire. In *piceus* and *pinguis* there are two small distant feebly developed emarginations, somewhat similar to those of *Eurymetopon*, but here they have no systematic value whatever, and are not approached by or connected in any way with the mandibles; the margin is almost invariably entire, and these exceptions appear to be rather in the nature of accidental and meaningless aberrations.

The known species occurring within the limits of the United States, including Lower California where they appear to be especially abundant, may be distinguished as follows:—

¹ In estimating the length of the metasternum and first ventral segment, the distances are measured on a longitudinal line passing through the coxæ, thus representing the minimum length of each, and include the entire metasternum, as the groove frequently becomes obsolete in this genus.

Section I.

Elytral striæ rather distinctly impressed; integuments pale and thin.

Epistoma subangularly and feebly lobed in the middle.....**texanus**

Epistoma rather narrowly and feebly sinuate at apex, without trace of median lobe; pronotum narrowly and feebly subexplanate at the sides.

marginatus

Elytral striæ not at all impressed.

Pronotum abruptly rugulose near the sides, the rugæ long, nearly even and strongly elevated; color rufo-piceous to piceous-black; integuments thick and dense.....**longulus**

Pronotum with merely semi-coalescent and shallower punctures or short confused rugæ toward the sides.

Prothorax widest near the base, the sides convergent and feebly arcuate thence to the apex; color pale; integuments thin; form narrow and very elongate.....**angustus**

Prothorax much shorter, with more strongly arcuate sides; integuments thick and dense, piceous-black; form short and robust.....**piceus**

Section II.

Base of the prothorax broadly distinctly bisinuate.

Oval, dark rufo-testaceous; elytra distinctly wider than the prothorax; sides of the latter broadly, evenly arcuate throughout.....**discretus**

Elongate, parallel, black; sides of the prothorax convergent and nearly straight from behind the middle to the apex.....**conicicollis**

Base of the prothorax transversely truncate.

Elytra with well-marked unimpressed series of approximate punctures.

Integuments highly polished.....**convexus**

Integuments very dull.....**subopacus**

Elytra without trace of series, evenly but irregularly punctured throughout; lustre strongly alutaceous; color pale ferruginous; form very broadly oval.....**pinguis**

Section III.

Eyes large, very prominent laterally, the tempora completely obsolete behind them.....**punctatus**

Section IV.

Basal angles of the prothorax obtuse, never prominent, sometimes very narrowly rounded.

Sides of the prothorax moderately arcuate.

Elytral striæ very distinctly impressed.....**obesus**

Elytral striæ not at all impressed.

Color black; upper surface moderately convex.

Larger species; lustre alutaceous.....**obtusus**

Smaller, polished; punctures toward the middle of the pronotum very much sparser.....**ater**

- Color dark castaneous ; body very convex ; punctures of the pronotum rather coarse and very dense **fallax**
- Sides of the prothorax very strongly, evenly rounded in a circular arc having its centre near lateral third of the pronotum.
- Castaneous, dull and alutaceous, the pronotum finely and extremely densely punctate throughout..... **thoracicus**
- Black, highly polished ; pronotum rather coarsely punctate and distinctly more sparsely so toward the middle..... **nitidus**
- Basal angles of the prothorax acute and prominent, the sides before them being distinctly sinuate for a short distance.
- Elytral series distinct throughout the width.
- Head large ; integuments very dull **crassicornis**
- Head small ; prothorax very short ; integuments polished.
- coarcticollis**
- Elytral series confused on the upper portion of the disk and with scarcely a trace of serial arrangement..... **acutus**

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E. texanus Lec.—New Spec. Col., 1866, p. 108.—Oblong-oval, moderately robust, somewhat depressed, pale brownish-testaceous throughout ; integuments rather thin, polished. *Head* rather small and transverse, not over one-half as wide as the prothorax, somewhat coarsely and densely punctate ; eyes large and slightly more prominent than the sides ; epistoma truncate, obtusely and angularly lobed in the middle, the lobe distinct and slightly deflexed ; antennæ long and slender. *Prothorax* fully three-fourths wider than long, the apex scarcely more than two-thirds as wide as the base, broadly subtruncate between the acute and strongly, anteriorly prominent angles ; base transverse, broadly, strongly bisinuate, the basal angles right, not at all rounded but not prominent, sides very evenly and rather strongly arcuate throughout ; disk about as wide at base as behind the middle, rather coarsely and sparsely punctate, the punctures unevenly distributed and distant by from once to twice their own diameters, but rapidly becoming very dense though scarcely confluent near the sides, the latter finely, acutely beaded. *Elytra* just visibly wider than the prothorax and more than three times as long, parallel, the apex ogival ; disk with distant, distinctly impressed striæ which continue to the apex and are coarsely, rather strongly and approximately punctate, the punctures variolate as usual ; intervals flat, each with a more or less regular single line of much smaller punctures which are confused toward the suture. Transverse metasternal groove very deep. *Legs* very slender, the posterior tarsi slightly but distinctly shorter than the tibiæ. Length 6.6 mm. ; width 2.9 mm.

Texas. Cab. LeConte.

The epistoma is evenly rounded laterally at the sutures, and not in the least emarginate ; the hind wings are very well developed.

This species is quite distinct and cannot easily be confounded with any other, the feebly produced angulate lobe of the epistoma

and rather distinctly impressed and entire elytral striæ giving it a peculiar appearance. Although the eyes are distinctly more prominent than the sides before them, they are much less so than in *marginatus*.

In common with all the winged species except *longulus*, the present appears to be quite rare and I have seen only the unique type.

E. marginatus n. sp.—Oblong, parallel, somewhat depressed, dark rufo-testaceous, the legs and antennæ paler and more flavate; integuments highly polished throughout. *Head* short and broad, rather coarsely, densely punctate; sides rapidly convergent from base to apex, the eyes large, very convex and very much more prominent than the sides of the head; epistoma narrow at apex, rather feebly but distinctly sinuate; supra-orbital ridges fine but distinct, extending well beyond the eyes, obsolete at the middle of their upper margin; antennæ slender, with a loose elongate club. *Prothorax* fully four-fifths wider than long, the apex rather distinctly narrower than the base, distinctly emarginate in circular arc, the apical angles rather acute and not at all rounded; base transverse, very feebly sinuate at each side of the middle, the angles slightly obtuse but not at all rounded; sides evenly and moderately arcuate; disk very slightly wider just behind the middle than at base, coarsely, rather densely punctate, the punctures becoming gradually longitudinally confluent toward the sides, the latter very narrowly but distinctly explanate. *Elytra* about three and one-half times longer than the prothorax and subequal to it in width, very slightly wider behind; apex ogival; sides subparallel, very slightly more arcuate behind; disk with feebly but distinctly impressed striæ, which extend unbroken almost to the apex, the striæ rather coarsely and very approximately punctured, the intervals flat, each with a moderately even series of distinct but smaller punctures, those of the sutural interval confused. *Abdomen* finely very sparsely punctate, the surface slightly scabrous and the punctures larger and closer near the sides. *Legs* long and slender, the posterior tarsi almost as long as the tibiæ. Length 6.5 mm.; width 2.8 mm.

Lower California.

A very distinct species, peculiar in its very prominent eyes; in its impressed elytral striæ it somewhat resembles *texanus*, but differs greatly in the structure of the epistoma.

E. longulus Lec.—Ann. Lyc. N. Y., V, p. 139 (*Eurymetopon*).—Elongate-oval, sometimes feebly inflated behind, rather strongly convex, highly polished throughout, blackish to rufo-piceous in color, the elytral setæ extremely minute, not attaining the external limit of the punctures. *Head* scarcely one-fourth wider than long, rather finely but deeply and densely punctate; epistoma transversely truncate or extremely broadly, feebly sinuate; eyes moderate, the ridges extremely fine and feeble, not extending much beyond the eye; antennæ long and slender, the club slender and loose. *Prothorax* about two-thirds wider than long, the apex slightly narrower than the base,

extremely feebly sinuate in circular arc, the apical angles right, not rounded; base transverse, broadly, feebly bisinuate, the basal angles slightly obtuse, not at all rounded; sides rather strongly arcuate, straight and feebly convergent in basal half; disk wider at the middle than at base, finely, sparsely punctate in the middle for a space equal to one-half the total width, then abruptly very deeply, longitudinally rugulose thence to the sides, the latter margined with a very fine cariniform bead. Scutellum minute, transverse. *Elytra* about three and one-half times longer than the prothorax and very slightly wider, the two bases equal in width; apex ogival; disk with unimpressed rows of shallow, rounded approximate punctures, generally moderate in size but becoming rapidly coarse toward base and especially near the humeri, the series extending to the apex; intervals flat, each with a single quite regular line of very fine feeble punctures, those of the sutural interval generally more irregularly disposed. *Abdomen* very finely, feebly and sparsely punctate. *Legs* slender, the posterior tarsi but just visibly shorter than the tibiae. Length 5.5–6.7 mm.; width 2.3–2.7 mm.

California (Los Angeles, Pomona and San Diego); Arizona.

The metasternum is scarcely perceptibly longer than the first ventral segment, and is feebly, very sparsely but rather coarsely punctate, the episternum similarly punctate. The transverse metasternal groove is strongly impressed.

A very common species, readily known by its slender parallel and rather convex form, very shining surface, and evenly and abruptly rugulose lateral portions of the pronotal disk. The hind wings are very well developed, being rather longer than the elytra.

E. angustus n. sp.—Very elongate-oval, moderately convex, very pale castaneous, strongly shining but not polished, the elytra distinctly alutaceous toward apex; elytral setae very small but projecting distinctly beyond the confines of the punctures. *Head* nearly one-half wider than long, the punctures moderately fine and dense, the epistoma very broad, the apex truncate or extremely feebly sinuate; eyes large, the ridges fine but strong, advancing distinctly beyond the eye; antennae slender. *Prothorax* scarcely three-fifths wider than long, the apex much narrower than the base, very feebly sinuate in circular arc; apical angles right, not at all rounded; the basal slightly obtuse, scarcely at all rounded; base transverse, broadly, feebly bisinuate; sides evenly convergent from base to apex, rather feebly and very evenly arcuate throughout; disk widest very near the base, finely, sparsely punctate, the punctures becoming rather abruptly much larger, coarse but shallow, extremely dense and partially coalescent in lateral fourth. *Elytra* nearly three and one-half times as long as the prothorax and, near the middle, very distinctly wider, the two bases equal in width; sides evenly, distinctly but feebly arcuate; apex ogival; disk with distant unimpressed rows of small shallow approximate punctures, which become but very slightly more distinct toward the humeri, the series becoming rather confused toward the apex;

intervals unevenly, finely, feebly and sparsely punctate, the punctures forming moderately even single series only in the lateral intervals. *Abdomen* finely, feebly punctate, the punctures sparse but much denser and more rugulose near the sides. *Legs* very slender, the posterior tarsi much shorter than the tibiae. Length 6.8 mm. ; width 2.6 mm.

Arizona.

The metasternum is quite perceptibly longer than the first ventral segment and is rather densely but not very coarsely punctate, the episternum densely punctured. This species is allied to *longulus*, but differs considerably in the longer prothorax, widest at or near the base and with the sides feebly arcuate, in the duller, more scabrous and more finely punctate elytra, with confusedly punctate intervals, in its shorter, broader head, with distinctly larger eyes, and in its paler, apparently thinner and more coriaceous integuments, being allied in this character more nearly to *texanus*. Although the punctuation toward the sides of the pronotum is very confluent and scabrous, it does not form the long, even and unbroken rugæ which are so characteristic of *longulus*.

E. piceus n. sp.—Oblong, rather robust and convex, parallel, piceous-black; legs and under surface paler, rufo-piceous; integuments feebly alutaceous. *Head* moderately transverse, rather finely, not very densely, rugulose punctate, the punctures of the epistoma much denser, deeper, rounded and not rugulose; apex broadly, feebly, angularly emarginate at the extremities of the epistomal suture; apex subtruncate; eyes rather large, but just perceptibly more prominent than the sides of the head; antennæ rather long, moderately slender, the eighth joint much longer than wide. *Prothorax* short, nearly twice as wide as long, the apex very feeble emarginate and but slightly more than three-fourths as wide as the base, the latter transverse, broadly and very distinctly sinuate at each side of the median lobe; basal angles slightly obtuse, the apical right, both without trace of rounding; sides evenly and rather strongly arcuate, the disk widest at about basal third, rather finely and sparsely punctate, the punctures gradually dense and semi-confluent toward the sides, the latter with a very fine acute marginal bead. *Elytra* three and three-fourths times as long as the prothorax and very slightly wider, the sides very feebly, evenly arcuate throughout, broadly ogival at apex; disk with unimpressed rows of rather small, rounded, shallow punctures which are separated by about twice their own diameters, not much larger toward the humeri, the series disappearing in confused punctures before attaining the apex; intervals with moderately even single rows of extremely small, widely distant punctures. *Abdomen* extremely finely, sparsely punctate, the punctures becoming quite coarse and denser near the sides. *Legs* moderate in length, the posterior tarsi distinctly shorter than the tibiae. Length 5.7 mm. ; width 2.4 mm.

California (San Bernardino Co.).

This species is quite distinct, differing from *longulus* in the feeble emarginations at the sides of the epistoma, in the much less rugulose sides of the pronotum, in the finer and more abbreviated elytral series, in its feebly alutaceous lustre and in its shorter, broader prothorax, as well as its generally shorter and more robust form. The anterior tibiæ are perfectly simple and without trace of outward extension at apex.

✱✱

E. discretus n. sp.—Elongate oval, very convex, highly polished, dark blackish-castaneous; under surface, legs and antennæ dark rufo-testaceous. *Head* transverse, rather finely and not very densely punctate, the punctures very dense toward the apical margin; eyes moderate, the ridges fine but strong; antennæ very slender, the club feeble and elongate, all the joints much longer than wide, the eleventh widely fusiform, a little narrower and longer than the tenth. *Prothorax* scarcely two-thirds wider than the head, two-thirds to three-fourths wider than long, the apex about four-fifths as wide as the base, feebly emarginate in circular arc, the angles varying from right to very slightly acute, not rounded; base broadly, distinctly bisinuate, the basal angles right, not at all rounded and extending posteriorly distinctly further than the median lobe; sides feebly arcuate, straighter toward base and apex; disk transversely strongly convex, extremely feebly so longitudinally, rather strongly, deeply, irregularly and sparsely punctate, the punctures somewhat abruptly rather coarser and longitudinally coalescent near the sides, forming prominent interlacing rugæ. *Elytra* evenly oval, in the middle about one-fourth wider than the prothorax, not more than three times as long, the two bases equal in width but not completely coarctate; disk with distant, unimpressed series of punctures which do not quite attain the apex and which are not traceable toward the suture, the punctures rather approximate, much larger and closer toward the humeral regions, very fine toward the suture; intervals flat, rather sparsely, confusedly punctate, the punctures closer and larger toward the sides near the base. *Abdomen* minutely, rather sparsely punctate, abruptly coarsely scabrous and duller near the sides. *Legs* decidedly short but very slender throughout, the posterior tarsi a little shorter than the tibiæ. Length 5.9–6.2 mm.; width 2.8–3.0 mm.

Arizona (Benson). Mr. Dunn.

The metasternum is very coarsely and deeply but somewhat sparsely punctate, the transverse groove not at all well developed, defined simply by a feebly impressed line of confused punctures, scarcely three-fourths as long as the first ventral segment.

This species is quite isolated and does not resemble any other

here described, but should be associated with *conicicollis* because of its strongly bisinuate base of the prothorax.

E. conicicollis n. sp.—Elongate-oval, strongly convex, polished, black, the under surface, legs and antennæ dark rufo-piceous. *Head* moderate, rather finely, deeply and densely punctate, the punctures much more crowded anteriorly; eyes moderate, scarcely perceptibly more prominent than the sides before them; epistoma broadly subtruncate; antennæ long and slender. *Prothorax* about three-fourths wider than long, trapezoidal in form, the apex but slightly more than two-thirds as wide as the base, very feebly emarginate in circular arc, the apical angles right, not in the least rounded; base transverse, broadly and very distinctly bisinuate, the basal angles right and very narrowly rounded, not at all prominent posteriorly; sides evenly convergent from near the base to the apex and almost straight, feebly arcuate near the base; disk widest a very little before the base, finely, very sparsely but distinctly punctate, the punctures becoming much coarser, very dense and semi-coalescent near the sides, the marginal bead very fine, not very strongly elevated or acute, becoming a very little more prominent near the base. *Elytra* parallel, equal in width throughout to the prothorax and barely three times as long, rather abruptly broadly angulato-parabolic at apex; disk with unimpressed series of small, rather feeble but very approximate punctures which become rather confused near the apex, the intervals flat, very minutely, sparsely and irregularly punctured. *Abdomen* extremely minutely and very sparsely punctate, the punctures becoming coarse but not very dense near the sides. *Legs* slender, the femora not robust; posterior tarsi not quite as long as the tibiæ. Length 6.2–7.0 mm.; width 2.7–3.1 mm.

Arizona.

The metasternum is, if anything, a little longer than the first ventral segment, coarsely, rather densely punctate in the anterior half, extremely minutely and sparsely so thence posteriorly to the transverse groove, which is well developed although obsolete as usual in the middle and not attaining the episterna.

This species is not closely allied to any other; *subopacus* which has a somewhat similarly shaped prothorax, has more inflated elytra, a straight transverse pronotal base and very dull lustre.

E. convexus Lec.—New Spec. Col., 1866, p. 107.—Elongate-oval, very strongly convex, polished throughout, piceous-black, often paler from immaturity; legs and antennæ dark piceo-testaceous. *Head* much wider than long, moderately convex, rather finely, very densely punctate, more densely so anteriorly; eyes moderate, barely more prominent than the broadly rounded sides before them; epistoma subtruncate or very feebly sinuate; antennæ long and very slender, the club elongate, loose and feeble, eighth joint much longer than wide. *Prothorax* from three-fifths to three-fourths wider than long, the apex about three fourths as wide as the base, feebly, evenly emarginate in

circular arc, the angles right and not prominent; base transverse, without trace of lateral sinuations; basal angles strongly obtuse, extremely narrowly rounded; sides strongly arcuate, usually a little straighter and more convergent toward apex; disk very slightly wider behind the middle than at base, very finely, densely punctate, the punctures denser but not coarser laterally where they are usually distinctly and longitudinally rugulose or coalescent; surface strongly convex longitudinally as well as transversely. *Elytra* subequal in width to the prothorax, sometimes just visibly wider, not quite three times as long; sides parallel and very feebly arcuate; apex parabolic, very strongly rounded at the immediate apex; disk with distant, unimpressed series of small, rather feeble and approximate punctures which are less distinct toward the suture and confused toward apex, the intervals flat, more finely, rather sparsely and confusedly punctate. *Abdomen* shining, finely, rather sparsely punctate, generally finely, feebly, longitudinally rugulose; punctures rather coarse toward the sides. *Legs* moderate in length, the femora somewhat robust; posterior tarsi rather distinctly shorter than the tibiae. Length 5.4–7.0 mm.; width 2.4–3.2 mm.

Texas; New Mexico; Arizona.

The metasternum is exactly equal in length to the first ventral segment, the transverse groove very well developed and the body totally apterous.

This species is very abundantly diffused through the regions indicated, but does not seem to extend to the westward of the Colorado River. The series before me is very extensive, consisting of forty-two specimens and indicates but slight variability; in one abnormal specimen, however, the sides of the prothorax are very broadly and feebly sinuate anteriorly.

For some unaccountable reason *convexus* has been heretofore confounded with the Californian *obesus*, a species distinct in all of its characters and belonging to a different section of the genus. My comparisons have been made from the original types of both.

E. subopacus Horn.—Trans. Am. Phil. Soc., XIV, p. 269.—Suboval, wider behind, very convex, smooth but very dull, piceous-black; under surface, legs and antennæ piceo-rufous. *Head* rather more than one-half as wide as the base of the prothorax, rather short and transverse; sides parallel and nearly straight in basal two-thirds, the eyes moderate, not at all prominent; apex broadly, very feebly sinuate, not emarginate laterally; surface rather finely but strongly, very densely punctate; antennæ long, slender, the eighth joint nearly one-half longer than wide. *Prothorax* trapezoidal, three-fifths wider than long; apex about three-fourths as wide as the base, broadly, extremely feebly sinuate, the angles right, narrowly but very distinctly rounded; base truncate and perfectly straight, the basal angles right and distinctly rounded; sides evenly convergent from base to apex and almost straight; disk very

narrowly subexplanate near the basal angles, very finely but distinctly and rather sparsely punctate, the punctures becoming more than three times as large, densely crowded and subcoalescent near the sides, the latter margined with a very fine acute bead. *Elytra* about three times as long as the prothorax and, in the middle, fully one-fifth wider; sides parallel and broadly but distinctly arcuate, almost continuous in direction with those of the prothorax; apex broadly ogival; disk with distant, unimpressed rows of rather small but very distinct, rounded and approximate punctures which continue to the apex but become very indistinct; intervals flat, extremely minutely, sparsely and irregularly punctate. *Abdomen* very finely, feebly rugulose, minutely but not very sparsely punctate. *Legs* slender, the posterior tarsi much shorter than the tibiae. Length 7.5 mm.; width 3.3 mm.

Arizona.

The metasternum is very coarsely, strongly and rather densely punctate, the punctures distinctly separated and variolate, with the transverse groove apparently well developed; it is distinctly shorter than the first ventral segment.

The trapezoidal form of the prothorax, the form of the body which is gradually narrowed in front from the middle of the elytra, the rounded prothoracic angles, dull lustre and very minute punctures of the stria intervals, will at once distinguish this species from any other of our fauna.

E. pinguis Lec.—N. Spec. Col., 1866, p. 107.—Broadly elliptical, rather strongly convex, dark rufo-ferruginous throughout, decidedly alutaceous in lustre. *Head* short and transverse, rather finely, very densely punctate: apex transversely truncate, with a small feeble angulate emargination on each side at the suture; eyes moderate, the external outline oblique but nearly straight, posteriorly divergent, the base coincident and equally prominent with the short tempus visible behind, but more prominent than the sides before them which are strongly rounded for a short distance, the fine fold or ridge short but distinct; antennae long and very slender. *Prothorax* two and one-fourth times as wide as long, the apex scarcely two-thirds as wide as the base, very distinctly emarginate in circular arc, the angles slightly obtuse but not rounded; base transverse and truncate throughout, with excessively feeble traces of the broad lateral sinuations; basal angles obtuse and very distinctly, rather broadly rounded; sides strongly arcuate toward base, nearly straight and convergent anteriorly; disk scarcely perceptibly wider a little before the base, rather finely but strongly and very densely, uniformly punctate throughout, the punctures more crowded but not distinctly tending to coalesce laterally, the surface very feebly subexplanate near the sides which are very minutely and rather feebly beaded. *Elytra* just visibly wider than the prothorax and between three and four times as long, the sides very feebly arcuate, the apex broadly parabolic; disk finely, somewhat sparsely punctate and without trace of series; the punctures finer and much more feeble than those of the pronotum.

tum, evenly distributed. *Abdomen* smooth but subalutaceous, finely, sparsely punctate, the punctures just visibly larger laterally. *Legs* long but somewhat robust, the posterior tarsi much shorter than the corresponding tibiae which are distinctly thickened toward apex, with the external edge broadly sinuous. Length 7.0 mm.; width 3.4 mm.

Lower California (Cape San Lucas). Cab. LeConte.

The metasternum is rather coarsely deeply and somewhat densely punctate throughout, about three-fourths as long as the first ventral segment and with the transverse groove apparently obsolete.

A very peculiar and isolated species in its short broad densely punctate prothorax and total absence of series of punctures on the elytra. The eyes in *pinguis* are very different in structure from those of *punctatus*, for in the latter they stand out from the head in bold relief, the tempora behind them being totally obsolete.

E. punctatus Lec.—New Spec. Col., 1866, p. 106.—Oblong-elongate, moderately and evenly convex, rather pale rufo-castaneous throughout, strongly shining. *Head* very short and strongly transverse, somewhat coarsely and very densely punctate; epistoma broadly, transversely truncate; eyes large, strongly arcuate externally and very prominent, extending far beyond the sides, the ridges fine but distinct; antennae very slender, nearly as long as the head and prothorax, the eighth joint almost twice as long as wide. *Prothorax* about four-fifths wider than long, the apex scarcely more than two-thirds as wide as the base, just visibly emarginate in circular arc, the angles slightly acute, not in the least rounded and slightly prominent anteriorly; base transverse, broadly, very distinctly bisinuate, the angles rather more posteriorly prominent than the median lobe, right and slightly blunt; sides evenly and moderately arcuate throughout; disk widest at or very near the base, rather coarsely and strongly punctate, the punctures somewhat sparse but densely crowded and semi-coalescent near the sides, the latter margined with a thin, acute and strongly reflexed bead which is equal throughout the length, the surface very feebly, broadly flattened, especially toward base. *Elytra* just visibly wider than the prothorax and fully three times as long, parallel, rather broadly rounded behind, the apex slightly and obtusely ogival, the sides nearly straight; disk with rather uneven, unimpressed, distant rows of small, rounded, approximate punctures traceable almost to the apex, the intervals sparsely, irregularly and slightly more finely punctate. *Abdomen* finely, sparsely punctate, the punctures but slightly coarser and not denser near the sides. *Legs* long, the femora slightly robust and coarsely, rather densely punctate; posterior tarsi slender, although much shorter than the tibiae, clothed beneath with coarse, dense yellow hair. Length 9.0 mm.; width 3.7 mm.

Lower California (Cape San Lucas). Cab. LeConte.

The metasternum is about three-fourths as long as the first ventral segment, and is uniformly very coarsely but sparsely and feebly punctate, the transverse groove very deeply excavated.

Punctatus is a very distinct form, of larger size than usual, and remarkable in the coarse densely hairy vestiture of the tarsi, very prominent eyes, as well as the bisinuate base of the prothorax; the last of these peculiarities it however possesses in common with *conicicollis* and *discretus*. In both the latter species the tarsi are sparsely clothed beneath with short spinose setæ as usual. The elytral striæ become very feebly impressed toward apex.

E. obesus Lec.—*Eurymetopon obes.*: Ann. Lyc. N. Y., V, p. 139; *nanulus* Casey: Descr. Not. N. A. Col., I, p. 45.—Oblong-oval, moderately robust, very convex, shining, the elytra sometimes slightly dull, piceous-black, the head and prothorax occasionally dark ferruginous from immaturity. Head moderately transverse, the sides nearly straight, finely but strongly, very densely punctate, the epistoma broadly truncate; eyes small, not prominent; antennæ short, robust, submoniliform, the eighth joint subquadrate, scarcely as long as wide. Prothorax about two-thirds wider than long, the apex nearly four-fifths as wide as the base, extremely feebly sinuate in circular arc, the angles right and very slightly blunt; base transversely truncate, sometimes very feebly, gradually sinuate toward the basal angles which in that case are just visibly prominent posteriorly, the angles right, narrowly rounded: sides evenly convergent from base to apex, evenly and very feebly arcuate throughout, disk widest at or very near the base, somewhat coarsely, densely and very strongly punctate, the punctures denser and longitudinally subcoalescent laterally, but not much larger, the sides very minutely, acutely beaded. Elytra just visibly wider than the prothorax and about two and one-half times as long, parallel, the sides feebly arcuate, the apex obtusely ogival; disk with distinctly impressed striæ of small, approximate, rather feebly impressed punctures, the striæ evanescent just before the apex; intervals broadly, very feebly convex, extremely minutely, sparsely and irregularly punctured. Abdomen finely but distinctly, not very sparsely punctate, the punctures becoming very large near the sides. Legs rather short, moderately slender, the posterior tarsi with sparse spinose setæ beneath, slightly shorter than the tibiae. Length 4.5–5.5 mm.; width 1.8–2.4 mm.

California (San Diego).

The metasternum is deeply, coarsely punctate, fully three-fourths as long as the first ventral segment, and the transverse groove is only suggested by a broadly and very feebly impressed line of unevenly placed punctures. The series before me consists of ten

specimens, the greatest variation being in the lustre; the species may be known at once by the very broadly and distinctly, although moderately, impressed striæ.

E. obtusus Lec.—N. Spec. Col., 1866, p. 107.—Oblong-oval, convex, moderately dull and alutaceous, smooth, black, the legs and antennæ dark rufous. *Head* moderately transverse, rather convex, finely, deeply punctate, the punctures well separated but becoming very densely crowded on the epistoma, the latter very broadly arcuate or subangulate at apex; eyes very small, not at all prominent; antennæ short and robust. *Prothorax* about two-thirds wider than long, the apex about four-fifths as wide as the base, quite distinctly emarginate in circular arc, the angles narrowly but distinctly rounded; base truncate, just visibly and broadly oblique laterally, the basal angles very obtuse, not rounded, not in the least prominent; sides evenly and rather strongly arcuate; disk a little wider just behind the middle than at base, finely but deeply and distinctly punctate, the punctures generally separated by from two to three times their width, but becoming somewhat abruptly dense, a little larger but not confluent, in lateral fourth; sides very minutely and feebly beaded. *Elytra* perceptibly less than three times as long as the prothorax and, in the female, subequal in width, but in the male distinctly wider in the middle; sides parallel, feebly arcuate, the apex rather strongly but broadly parabolic; disk with widely distant, slightly uneven, unimpressed rows of small approximate punctures, the series confused near the apex, the intervals very finely, somewhat sparsely, unevenly and confusedly punctate. *Abdomen* very minutely, sparsely punctate, the punctures coarse but sparse and feeble laterally. *Legs* moderate, the posterior tarsi rather distinctly shorter than the tibiæ. Length 5.8–6.8 mm.; width 2.4–2.8 mm.

California (Napa and Sonoma Cos.).

One of the larger of the species having short robust antennæ, and readily distinguishable by the very distinctly arcuate sides of the prothorax, convergent toward base, and the broadly obtuse but not rounded basal angles. It is rather local and not abundant.

The metasternum is scarcely three-fourths as long as the first ventral segment; the basal groove is widely interrupted in the middle, disappearing in a row of punctures at lateral fourth.

E. ater Lec.—Ann. Lyc. N. Y., V, p. 139 (*Eurymetopon*).—Oblong-oval, strongly, cylindrically convex, polished, black, the legs and antennæ dark rufous. *Head* moderate, nearly two-thirds as wide as the prothorax, rather transverse, broadly, distinctly arcuate at apex, rather finely but deeply and very densely punctate, the punctures usually sparser toward the occiput; eyes small, the fold short and fine but distinct; antennæ short, very robust. *Prothorax* short and transverse, nearly twice as wide as long, the apex fully four-fifths as wide as the base, evenly and rather distinctly emarginate in circular arc, the angles right and narrowly rounded; base truncate, the angles obtuse,

not rounded and not prominent; sides evenly, not very strongly arcuate, feebly convergent and nearly straight toward base; disk just perceptibly wider at the middle than at base, finely and sparsely punctate in middle two-fifths, the punctures gradually larger and very dense but not coalescent laterally. *Elytra* distinctly more than three times as long as the prothorax and subequal in width to the latter, occasionally just visibly wider: apex rather acutely rounded; sides parallel and extremely feebly arcuate; disk with distant, unimpressed series of moderately large and approximate punctures, which are distinctly traceable throughout the width, but confused near the apex, where the punctures generally become finer and the surface lustre a little duller; intervals more or less evenly, uniseriately and more finely punctate. Length 4.5–5.3 mm.; width 2.0–2.3 mm.

California (San Francisco).

This is a plentiful species near the coastline of middle California, and the description refers to the typical form. The specimen marked “? S. D.” in the Cabinet of LeConte, which is referred to in the original description, differs only in having the punctures of the principal series a little larger, deeper and less approximate; it is not specifically distinct and the locality is probably erroneous. I have, however, a single specimen which was taken by me in the Sierras at Truckee, which seems to indicate an extremely closely allied species, having a slightly less transverse prothorax, with the basal angles very small and slightly prominent, also another single specimen taken at San Francisco, which is distinctly larger than any other of the fifteen examples, with a distinctly longer, much more sparsely punctured prothorax; the length of this specimen is 5.8 mm.; both those last referred to are probably specifically distinct.

E. fallax n. sp.—Oblong-oval, very strongly convex, rather distinctly shining but not strongly polished, very slightly alutaceous near the elytral apex; color dark castaneous-brown, the under surface, legs and antennæ paler, rufo-ferruginous. *Head* moderate, broadly rounded at apex, finely, deeply and very densely punctate, the eyes and antennæ as usual. *Prothorax* rather more than three-fourths wider than long, the apex very distinctly narrower than the base, feebly, evenly sinuate in circular arc, the angles right and very narrowly rounded; base truncate, the angles obtuse but not rounded; sides moderately arcuate, more convergent and rather straighter toward apex; disk slightly wider just behind the middle than at base, not very finely, very deeply, perforately and densely punctate, the punctures very slightly less dense toward the middle. *Elytra* nearly three times as long as the prothorax and, in the middle, quite distinctly wider; sides parallel and feebly arcuate; apex acutely ogival; disk rather coarsely and strongly but moderately densely punctate, the punctures fine and feeble near the apex as usual, the unimpressed series not distinctly traceable except toward the sides, the punctures

of the intervals being but slightly smaller and equally widely separated. *Abdomen* rather strongly and deeply but not very densely punctate throughout. *Legs* normal. Length 6.4 mm.; width 2.8 mm.

New Mexico (Santa Fé). Miss M. W. Greene.

A robust and very convex species, bearing a deceptive external resemblance to *convexus*, but easily distinguishable by the characters given in the table.

E. thoracicus n. sp.—Oblong, rather strongly convex, dull and alutaceous, dark piceo-castaneous throughout, smooth. *Head* moderate, transverse, broadly, rather strongly arcuate at apex, finely, deeply, very densely punctate, the eyes small and antennæ robust. *Prothorax* about four-fifths wider than long, the apex slightly narrower than the base, almost transversely truncate, being just perceptibly incurvate, the angles very slightly obtuse and rather broadly rounded; base truncate, the basal angles very obtuse but not rounded and not in the least prominent; sides parallel, very strongly, evenly rounded in circular arc from base to apex; disk much wider in the middle than at base, finely, deeply and very densely punctate, the punctures equally dense throughout the width, the lateral bead extremely fine. *Elytra* equal in width to the prothorax and three times as long, the sides parallel and just perceptibly arcuate, the apex rather obtuse; disk with very feebly impressed striæ of small but deep and very approximate punctures, the series not attaining the extreme apex; intervals flat, very finely, rather sparsely and irregularly punctate. *Abdomen* rather coarsely and densely punctate throughout the width. *Legs* moderate, the posterior tarsi much shorter than the tibiæ. Length 6.6 mm.; width 2.6 mm.

California (San Geronio Pass?)

The metasternum is just visibly shorter than the first ventral segment, rather coarsely, deeply, very densely and conspicuously punctate, the usual transverse groove indicated by a very broadly, feebly impressed series of smaller and unevenly placed punctures.

This is one of the most distinct species of this section of the genus, distinguishable at once by the very strongly arcuate sides and obtuse basal angles of the prothorax and finely, evenly punctured disk; the very feeble impression of the elytral series may possibly be an accidental characteristic of the unique example, but at all events the series themselves are much more distinct than usual.

E. nitidus n. sp.—Elongate-ovoidal, rather strongly convex, highly polished, black, the antennæ black; legs very dark rufo-piceous. *Head* nearly two-thirds as wide as the prothorax, rather transverse, broadly arcuate throughout at apex, rather convex, finely, deeply and densely punctate; eyes small, the folds short but very distinct; antennæ short and robust. *Prothorax* short, five-sixths wider than long, the apex slightly narrower than the base,

very feebly, evenly sinuate in circular arc, the angles just visibly obtuse and quite distinctly rounded; base truncate, the angles extremely obtuse and just visibly rounded or blunt; sides evenly, very strongly rounded in circular arc from base to apex; disk very much wider in the middle than at base, very strongly convex longitudinally as well as transversely, rather coarsely, very deeply and densely punctate, the punctures distinctly separated toward the middle, the marginal bead extremely fine and feeble. *Elytra* oval, fully three times as long as the prothorax and, in the middle, not very distinctly wider; sides parallel, broadly and distinctly arcuate; apex broadly parabolic; disk with unimpressed and distant series of somewhat approximate and rather deeply impressed punctures, confused near the apex where the punctures are finer and the surface dull; intervals finely, sparsely but distinctly punctate, the punctures irregularly disposed but tending to a uniseriate arrangement laterally. *Abdomen* finely, sparsely but very distinctly punctured. *Legs* moderate. Length 5.6-6.0 mm.; width 2.2-2.4 mm.

Arizona (Seligman and Cañon Cosnino). Mr. Wickham.

This species is quite distinct in its very obtuse basal angles of the prothorax and strongly arcuate sides of the latter.

E. crassicornis n. sp.—Oblong-elongate, broadly convex, parallel, smooth but very dull, black, the legs and antennæ dark rufous. *Head* nearly as in *obtusus*. *Prothorax* fully three-fourths wider than long, the apex nearly five sixths as wide as the base, broadly and extremely feebly sinuate, the angles right and very narrowly rounded; base transversely truncate; basal angles acute, prominent and not at all rounded; sides feebly arcuate and convergent anteriorly, nearly straight and parallel posteriorly and distinctly sinuate very near the base; disk not very finely but deeply and very densely punctate, the punctures generally separated by from once to twice their own diameters, but becoming gradually extremely dense and crowded although not exactly in contact in lateral third; marginal bead very fine but distinct. *Elytra* subequal in width to the prothorax and about three times as long; sides parallel and scarcely visibly arcuate posteriorly; apex narrowly rounded; disk punctured as in *obtusus*. *Abdomen* very finely and sparsely punctate, the punctures becoming larger but not very coarse laterally. *Legs* nearly as in *obtusus*. Length 6.0 mm.; width 2.7 mm.

California (Hoopa Valley, Humboldt Co.).

This species in general appearance somewhat resembles *obtusus*, but differs in its still duller and very opaque integuments, more parallel and less arcuate sides and less strongly emarginate apex of the prothorax, the latter being more transverse, rather more coarsely and densely punctate and with the basal angles acute and slightly everted; the pronotum is less longitudinally convex, and the entire body is more parallel.

E. coarcticollis n. sp.—Oblong-oval, black, strongly convex, highly polished throughout. *Head* small, about one-half as wide as the prothorax, wider than long, rather convex, finely, deeply and densely punctate; epistoma broadly, very distinctly and evenly arcuate at apex; eyes small, the upper fold extremely short and feeble; antennæ short, very robust. *Prothorax* twice as wide as long, the apex five-sixths as wide as the base, evenly, feebly but distinctly emarginate in circular arc; base truncate, the basal angles slightly obtuse, small, not at all rounded and distinctly prominent; sides rather strongly arcuate, more convergent and straighter anteriorly, distinctly but broadly sinuate before the base; disk much wider at basal third than at base, finely, rather sparsely punctate near the middle, the punctures becoming slightly larger and very dense but not coalescent laterally. *Elytra* nearly three and one-half times longer than the prothorax and, in the middle, very distinctly wider, ovoidal, acutely rounded at apex; sides parallel and very distinctly arcuate; disk very convex, with distant, unimpressed rows of small, moderately close-set punctures which are distinctly traceable throughout the width and continuing nearly to the apex; intervals sparsely and more finely punctate, the punctures confused near the suture but tending to a uniseriate arrangement thence to the sides. *Abdomen* polished, finely, sparsely punctate, coarsely so near the sides. Length 4.8 mm.; width 2.1 mm.

New Mexico (Fort Wingate). Dr. Shufeldt.

This small species is allied to *acutus*, but differs in its much shorter more transverse prothorax and distinct elytral series, also in its smaller head and slighter coarser punctuation.

E. acutus Horn.—Trans. Am. Phil. Soc., XIV, p. 270.—Oblong-oval, more or less inflated behind, strongly convex, polished, the elytra becoming gradually dull toward apex, black, the legs dark rufous. *Head* moderate, rather convex, finely, very densely punctate; apex broadly but distinctly arcuate; eyes very small; antennæ robust and short. *Prothorax* about three-fourths wider than long, the apex fully four-fifths as wide as the base, just visibly incurvate in circular arc, almost truncate, the angles right and slightly blunt; base truncate, the angles small, right, not at all rounded and distinctly prominent; sides almost evenly and rather strongly arcuate, abruptly and distinctly sinuate for a short distance before the base; disk finely but deeply and distinctly punctate, the punctures generally separated by fully twice their own widths but becoming gradually very dense, almost contiguous, although not confluent, toward the sides. *Elytra* a little less than three times as long as the prothorax and, behind the middle, quite distinctly wider, broadly ogival at apex; sides distinctly arcuate; disk finely, rather sparsely and irregularly punctate, with very imperfectly defined, distant, unimpressed series of slightly larger punctures only toward the sides and especially near the base. *Abdomen* finely, sparsely punctate, as usual much more coarsely and generally more densely so near the sides. *Legs* moderate, the posterior tarsi very distinctly shorter than the tibiae. Length 4.2–4.8 mm.; width 2.0–2.2 mm.

Nebraska—Cab. LeConte; Colorado.

The series of punctures on the elytra are less distinct than in any other species of this group, and on the inner half are only traceable under careful observation and with the exercise of a considerable amount of imagination. The prothorax is slightly wider just behind the middle than at base.

EPITRAGUS Latr.

The species of *Epitragus* are, in general, strongly isolated among themselves, in fact more conspicuously so than in any other Tenebrionide genus which I can recall to mind at present; the transverse prosternal groove is well developed in all the representatives which I have seen. The following species is not closely related to any other:—

E. fusiformis n. sp.—Elongate, fusiform, rather slender, moderately convex, piceous-black with an æneous tinge, polished between the extremely dense punctures. *Head* fully as long as wide, finely, deeply, very densely punctate; supra-orbital fold completely obsolete above the eye, feebly evident for a short distance before it; antennæ rather long, but strongly and gradually clavate, the third joint long, tenth a little wider than long. *Prothorax* about one-fifth wider than long, the apex three-fourths as wide as the base, transversely truncate between the strongly advanced and acute apical angles; base broadly, strongly lobed in the middle; basal angles right, not at all rounded, sometimes feebly prominent; sides extremely feebly, nearly evenly arcuate. *Disk* finely but deeply and very densely punctate, the punctures finer and in close contact near the sides, distinctly separated toward the middle where there is a narrow impunctate median line. *Elytra* at base not distinctly wider than the prothorax, rather less than three times as long as the latter and, near the middle, two-fifths wider, finely, irregularly, evenly and extremely densely punctate throughout, the punctures shallow, each bearing an excessively minute robust acuminate seta which does not project much beyond the limit of the puncture; apex acutely ogival. *Abdomen* finely, very densely punctate, and with short fine inconspicuous pubescence. Length 10.5–11.2 mm.; width 4.7 mm.

Arizona.

The mesosternum is deeply and acutely excavated as usual. In *tomentosus*, however, the mesosternum is not even distinctly impressed and that species will therefore have to be placed in another genus for which I would suggest the name *Epitragodes*.

The only species with which *fusiformis* can be compared is *plumbeus*, but it differs very greatly from that species in its promi-

nent and acute apical angles of the prothorax, and in the very minute vestiture.¹

CHILOMETOPON Horn.

This genus is composed of two distinct sectional groups; the metasternal groove is very distinctly impressed throughout and the wings well developed. The species may be distinguished as follows:—

- Last joint of the antennæ about as long as the two preceding together.....**I**
 Thoracic angles acute and prominent; metasternum between coxa and groove about one-half longer than the first ventral segment.....**pallidum**
 Thoracic angles not prominent; metasternum subequal in length to the first ventral segment.....**abnorme**
 Last antennal joint shorter.....**II**
 Castaneous, shining; form oblong-oval.....**helopioides**

I have before me two specimens of a species which is almost undoubtedly distinct from *helopioides*, the apical angles of the

¹ The following is not described among the numerous Mexican species published by Mr. Champion; it belongs to the section having the middle lobe of the epistoma produced and rounded, and the pronotum similar in the sexes.

E. gracilis n. sp.—Fusiform, slender and elongate, moderately, evenly convex, bright æneous, polished; pubescence very short and coarse, sparse and very inconspicuous. *Head* rather finely, deeply, not very densely punctate, very sparsely so in the middle; supra-orbital fold obsolete above the eye, but feeble and slightly arcuate before it; antennæ long. *Prothorax* but slightly more than one-fourth wider than long, the apex distinctly narrower than the base, subtruncate between the very acute and greatly advanced and prominent angles; base strongly lobed in the middle, the basal angles acute and prominent; sides very feebly arcuate, sinuate near the basal and apical angles; disk with an elongate-oval, foveolate impression just before the scutellum, also impressed laterally along the basal margin, finely, very sparsely punctate, the punctures extremely fine and rather feeble toward the middle, without trace of an impunctate median line. *Elytra* at base but very slightly wider than the prothorax, less than three times as long as the latter and, in the middle, about one-third wider; apex gradually very acute; humeri rounded; disk finely, irregularly punctured, the punctures rather dense laterally, sparser and with indefinite distant series of very fine punctures toward the suture. Mesosternum deeply excavated. Length 10.0 mm.; width 4.0–4.3 mm.

Mexico—State of Guerrero. Mr. Baron.

The elytra have very broadly and feebly impressed longitudinal sulci, which are more pronounced toward the suture, the intervals there becoming very feebly convex and equal to them in width; this structure is very similar to that previously described in *Eurymetopon discors* and other allied species.

prothorax being right, not rounded, not everted and not prominent, but in the absence of a typical representative of the latter species I am unable to describe it; the specimens were collected at El Paso, Texas.

C. pallidum n. sp.—Moderately convex, pale luteo-testaceous throughout, rather shining, subglabrous, the widely scattered setæ slightly evident behind. *Head* finely, rather feebly but densely punctate; eyes large, supra-orbital fold fine, short; antennæ long and slender. *Prothorax* not more than one-third wider than the head, two-fifths wider than long; apex about as wide as the base, very feebly arcuate between the advanced, acute and prominent angles; base transverse, broadly bisinuate, the basal angles slightly acute and prominent; sides strongly, subangularly arcuate at or just before the middle, thence convergent and straight or broadly, extremely feebly sinuate to base and apex; disk rather coarsely but variolately punctate, the punctures very densely crowded laterally, very slightly separated toward the middle, with a broad, subimpunctate and irregular median line. *Elytra* across the humeri almost one-fourth wider than the pronotal disk, behind the middle from one-third to one-half wider than the latter, nearly four times as long; disk rather finely, subserially punctate; humeri rounded. Length 6.4–7.0 mm.; width 2.6–3.0 mm.

Texas (El Paso).

In addition to the characters given in the table, this species differs from *abnorme* in its larger size, more robust form, paler color and shorter, almost squarely truncate middle lobe of the epistoma; in *abnorme* the middle lobe is evenly, almost semi-circularly rounded and is much longer. The series consists of five specimens and does not indicate any notable variation either in color or size.

ZOPHERUS Lap.

Z. induratus n. sp.—Robust and convex, deep black throughout, the pronotum dull and with a strong alutaceo-sericeous lustre; elytra more shining. *Head* moderate, sparsely, not very coarsely punctate; antennæ very short and robust. *Prothorax* fully as long as wide, widest and with the sides very broadly subangulate at two-fifths the length from the apex, the latter broadly emarginate, subtruncate between the advanced and narrowly rounded angles; base equally wide, very feebly arcuate; sides convergent from anterior two-fifths to the base and broadly obtusely subangulate at basal third; disk convex, coarsely but sparsely punctate, the punctures strongly muricate. *Elytra* about two-thirds longer than the prothorax and, in the middle, nearly one-fourth wider, evenly oval, convex, feebly emarginate at base; disk strongly but rather finely, densely and confusedly tuberculate, the two apical tubercles very strong, the channels very deep but rather short. *Abdomen* coarsely, sparsely, punctate. Length 16.5 mm.; width 7.0 mm.

California (Julian). Mr. Dunn.

This species is somewhat allied to *granicolis*, but differs in its shorter, less slender form relatively wider, more finely and densely tuberculose elytra and very much finer and more asperate punctures of the pronotum; the elytral tubercles are strongly shining.

In *granicolis* the elytra are but just perceptibly wider than the prothorax and are much more elongate-oval. In *induratus* the space separating the antennal cavities from the lateral thoracic margin is scarcely two-thirds as wide as in *granicolis*, and the transverse cavity of the fifth abdominal segment is bounded posteriorly by an evenly sinuous wall, while in *granicolis* the posterior wall of the cavity is abruptly and strongly toothed in the middle; this is a very important difference, for on examining a series of seven specimens of *tristis*, composed of males and females, I cannot perceive the slightest variation in the form of this curious excavation sexual or otherwise; in *tristis* the posterior wall of the cavity has a small rounded lobe in the middle, not by any means as prominent and dentiform as in *granicolis*. Four specimens of *concolor* show no variation in the form of the cavity which is nearly as in *granicolis*; it is also very similar in *opacus* and *gracilis*.

The sculpture of the pronotum in *induratus* is very nearly as in *opacus*, but the elytra are entirely different.

ARÆOSCHIZUS Lec.

The species of this singular genus are remarkably uniform in size, and at the same time strongly isolated and specialized; those before me may be easily known by the following characters:—

Anterior and intermediate tibiae unarmed.

Vestiture of the elytral costæ erect and fimbriate; intervals each with a single line of similar but much more widely spaced setæ.

Elytral setæ finely spinose.....**costipennis**

Elytral setæ extremely coarse, truncate or subclavate at apex: pronotum with two fine even lines of setiform scales.....**fimbriatus**

Vestiture of the elytral costæ broadly squamiform and subrecumbent.

Elytral intervals each with a median line of scales.....**regularis**

Elytral intervals without a median series.

Prothorax very much shorter and narrower than the head, broadly, strongly, impressed in the middle throughout the length.

sulcicollis

Prothorax but slightly shorter and narrower than the head, evenly convex, without median impressed groove, having a feeble subfoveolate impression near the base.....**simplex**
 Anterior and intermediate femora dentate.....**armatus**

The characters of *armatus* are taken from the original description.

A. fimbriatus n. sp.—Rather robust and convex, moderately shining, dark piceous-brown, the elytra much paler, rufo-ferruginous; vestiture pale flavate. *Head* slightly longer than wide, the apex with a feebly rounded emargination which is finely denticulate throughout its width; sides nearly straight and very feebly convergent behind from apical third, the basal angles rounded; surface somewhat coarsely and densely punctate, longitudinally impressed near the eyes, clothed with erect arcuate strongly clavate setæ; antennæ robust, nearly as long as the head and prothorax, densely clothed with robust erect scales, outer joints strongly transverse. *Prothorax* as wide as long, slightly narrower and very much shorter than the head; base and apex subequal and subtruncate; sides rounded anteriorly, strongly convergent and sinuate toward base; disk surrounded throughout with dense fimbriæ of extremely coarse erect hairs, those of the sides longer than those of the bases; surface rather finely, extremely densely punctate and dull, with two even parallel lines of closely placed suberect scales which are separated by about one-third the width, the interval scarcely perceptibly impressed except near the base and totally devoid of pubescence; surface thence to the sides with a few widely scattered and smaller scales. *Elytra* oval, three-fourths longer than wide, in the middle about twice as wide as the prothorax, the costæ very strong, each bearing a dense series of unusually long erect extremely robust hairs, the intervals each with two series of very coarse deep punctures and a single line of similar setæ which are much more widely spaced. *Abdomen* coarsely and densely punctate throughout. *Legs* moderate. Length 4.0 mm.

Arizona (Tuçson). Mr. Wickham.

This species is not at all closely allied to any other, and may be easily distinguished by its more robust form and very prominent lateral and costal fimbriæ; also by the two even setose lines of the pronotal disk.

A. simplex n. sp.—Rather slender, very dark piceous-brown, alutaceous in lustre. *Head* slightly longer than wide; sides behind the eyes just visibly convergent for a short distance, then very gradually, broadly rounded to the neck, the hind angles entirely obsolete; antennæ very robust, cylindrical, the tenth joint wider, eleventh very small. *Prothorax* slightly but distinctly narrower and shorter than the head, slightly longer than wide; base and apex equal, truncate, densely fimbriate with long, porrect and very robust setæ; sides strongly rounded anteriorly, rather distinctly convergent and very broadly, feebly sinuate thence to the base, the basal angles rather prominent;

disk widest at less than one-third the length from the apex, moderately densely fimbriate at the sides with very coarse erect bristles, which are shorter than those of the apices, rather coarsely and sparsely punctate. *Elytra* evenly elliptical, twice as long as wide, rather more than twice as wide as the prothorax, the costæ very strongly elevated; intervals each with two rows of extremely coarse, perforate punctures. *Abdomen* rather finely, sparsely punctured. Length 3.8–4.4 mm.

Texas (El Paso); Arizona (Tucson).

Allied to *sulcicollis* but differing in the vestiture of the antennæ which, in that species, is much longer, more slender and conspicuous, also in the characters given in the table. The prothorax is much larger than in *sulcicollis*, although still distinctly smaller than the head, and the absence of a median groove will readily distinguish it.

ASIDA Latr.

A. angustula n. sp.—Slender, convex, dark castaneous throughout; sides subparallel; upper surface very sparsely covered with short, very fine, erect hairs; legs densely clothed with short, stiffer and less erect hairs which are more conspicuous on the tibiæ and tarsi; anterior tibiæ with the exterior angle acute and prominent. *Head* moderate, coarsely and rather densely punctate; antennæ short but very slender, not longer than the prothorax, not incrassate but with the tenth joint triangular and abruptly much wider than the ninth, fully as long as wide, eleventh as usual very small. *Prothorax* about two-fifths wider than long; sides parallel and rather strongly arcuate, very feebly sinuate near the basal angles which are acute and slightly prominent posteriorly, the base transversely truncate between them; apex broadly, rather strongly emarginate in circular arc; disk widest at the middle, more longitudinally convex in basal half thence declivous and transversely convex in middle two-thirds to the apex, transversely feebly impressed near the base; sides rather feebly and not very widely reflexed throughout; surface rather coarsely, deeply and densely punctate, the punctures rounded, perforate and not at all muricate. *Elytra* more than three times as long as the prothorax and, in the middle, scarcely one-third wider; sides parallel and feebly arcuate; humeri obtuse and not prominent; apex rather abruptly declivous; lateral margins fine but distinct, terminating abruptly near the apex; disk strongly, evenly, transversely convex throughout, finely, very sparsely and irregularly punctate, each puncture having immediately before it a fine but very strong, perfectly erect, obtusely-pointed tubercle; discal costæ completely wanting. *Legs* short but slender, the pubescence pale ferruginous yellow and conspicuous. Length 14.0–15.0 mm.; width 6.0–6.5 mm.

California (exact locality unknown). Mr. G. W. Dunn.

This species can be compared only with *muricatula* Lec., but differs in its much more slender form, in the shorter and sparser

hairs of the dorsal surface, and in its densely pubescent legs. The four specimens before me do not indicate any variation.

CONIONTIS Esch.

A somewhat extensive genus, restricted in habitat to the true Pacific coast fauna. In the latitude of Puget's Sound the species extend into the mountains of western Montana, where specimens of *oralis* have been taken in the Bitter Root valley. Proceeding southward, the eastern limit of range seems to approach the coast, the area becoming gradually narrower, and finally vanishing with a few peculiar species in the neighborhood of San Diego. It has been stated that one species extends its range to the eastern slopes of the Rocky mountains, but this is doubtful, there having been in all probability some confusion of localities. Beyond the southern limit, as here defined, the genus is replaced by the closely allied *Carlotaxis*, which is confined in habitat as far as known to the single small island of Guadalupe. The geological conditions existing long ago in the Tertiary, which have given rise to this isolated group of species, will be further discussed under the head of *Coniontis lata*.

There are several circumstances which render the identification of the species a very difficult and uncertain task, even for the present family, and among these should be mentioned the almost total absence of any structural differences, also the marked persistence and uniformity of type, and, at the same time, a considerable amount of individual variation. It is almost absolutely essential therefore to study large series of specimens, at least of several species, in order that the peculiar laws of variation may be adequately appreciated. The only noticeable structural variable, if such it can be called, refers to the prosternal process, which is sometimes surrounded by a fine convex bead and at other times simple, but I find that this character is of but little value.

Each puncture of the elytra bears a seta, sometimes erect, but generally recumbent, occasionally extremely short, not projecting notably beyond the puncture, but sometimes much longer; after careful study of extensive material, it seems probable to me that this scanty vestiture may afford the best means of arbitrarily grouping the species. It must be noted, however, that as these setæ are brittle and sometimes easily removable, care must be

taken in the case of old specimens, to examine them under sufficient power to reveal their condition; if broken and consequently abnormally short, which can be readily determined, it is very rare that one or two occasional setæ will not remain to indicate the nature of the normal vestiture. When perfect the setæ are finely pointed and quite constant in size throughout the individuals of a species.

The Coniontini constitute a very isolated tribe, but as we are compelled under the present classification to retain it in the Asidinae, on account of the presence of a distinct trochantin, it would undoubtedly be more consistent to place it at the beginning of that subfamily than at the end, because of the extent and obliquity of the posterior coxæ, in which it finds many parallels among the Tentyriinae, but stands absolutely alone in the Asidinae.¹

The known species of Coniontis may be identified as follows:—

Vestiture consisting of extremely minute robust setæ, generally silvery in color.

Elytra coarsely, deeply punctate.

Abdomen coarsely punctate, generally more or less rugulose; body very large and robust.....**abdominalis**

Abdomen finely punctate, not rugulose; body less robust.

Pronotal punctures rapidly very coarse and rather dense toward the sides.....**ovalis**

Pronotal punctures extremely sparse and minute throughout the disk.

inæqualis

Elytra very finely punctate.

Form robust, scarcely ever distinctly more than twice as long as wide.

Pronotum very minutely and sparsely punctate; larger species.

Elytral margin forming a strongly arcuate line when viewed laterally.

robusta

Elytral margin forming a straight line when viewed laterally.

elliptica

Pronotum densely punctate.

Base of the prothorax strongly bisinuate.....**lata**

Base very feebly bisinuate.....**opaca**

Form slender, always distinctly more than twice as long as wide.

Sides of the head more prominent than the posterior canthus of the eye.

Very dull and finely alutaceous; prothorax short and transverse, extremely coarsely punctured toward the sides; femora very coarsely punctate.....**punctipes**

Highly polished; prothorax very long and strongly developed; femora very minutely and sparsely punctate.....**elongata**

¹ As a general rule in this subfamily the hind coxæ are small, transverse, and ovoidal, or pointed outwardly, coming very far from attaining the sides of the body.

Sides of the head less prominent than the posterior cantlus of the eye ;
 sides of the prothorax more strongly convergent from base to apex ;
 body more longitudinally convex**viatica**
 Vestiture consisting of long and distinctly visible hairs or setæ, which are
 usually fulvo-ferruginous in color.

Elytral punctures very coarse and deep, the surface more or less strongly
 rugulose.

Larger species ; head relatively slightly larger and more finely punctate.

eschschoitzii

Smaller and very slightly less convex ; prothorax distinctly shorter and
 more transverse**nemorialis**

Elytral punctures fine or moderate in size ; surface generally more or less
 obsoletely rugulose.

Pronotal punctures very dense ; elytral punctures extremely fine and un-
 evenly distributed, being aggregated in undefined longitudinal masses ;
 size very small ; form slender**puncticollis**

Pronotal punctures but moderately dense toward the sides ; elytral punc-
 tuation even or very nearly so.

Elytral pubescence toward apex moderately dense, fine and recumbent.

Head moderate in size, never much less than one-half as wide as the
 base of the prothorax.

Form broadly evenly oval, strongly convex, and not more than
 twice as long as wide ; very dull**alutacea**

Form more or less oblong-elongate, with the sides nearly straight ;
 body more depressed.

Prosternum very coarsely, deeply punctate ; pubescence of the
 upper surface long and conspicuous**subpubescens**

Prosternum more finely and sparsely punctate ; pubescence of
 the upper surface much less conspicuous.

Elytral punctures very fine, distinctly smaller than those toward
 the sides of the pronotum.

Larger species (10.8-13.0 mm.)**montana**

Small species (8.2-9.0 mm.)**pallidicornis**

Elytral punctures distinct, larger than those of the pronotum.

Pronotal punctures fine**genitiva**

Pronotal punctures very coarse**parallela**

Head very small ; prothorax strongly narrowed from base to apex, the
 pronotum very coarsely punctured ; pubescence throughout dense,
 long, persistent and very conspicuous ; form elliptical, convex ;
 size small**parviceps**

Elytral pubescence toward apex extremely dense, short, erect, coarse
 and hispid ; body oval, very convex**setosus**

The genus, as here considered, is confined to those species which
 have the eyes entire and simply emarginate anteriorly, those with
 completely divided eyes being treated below as a distinct genus.

In the material before me there are some other doubtful forms represented in each case by one or two specimens. Some of these will quite probably prove to be valid species, but I have preferred not to name them at present.

C. abdominalis Lec.—Proc. Ac. Phila., 1859, p. 77.—Robust, strongly convex, parallel, but slightly more than twice as long as wide, shining. *Head* rather small and coarsely punctate; antennæ black, rather robust. *Prothorax* nearly two-thirds wider than long, generally widest at about the middle, the sides thence parallel and nearly straight to the base, broadly rounded anteriorly; base transverse, the angles very feebly produced posteriorly; disk very finely and sparsely punctate, a little more coarsely and densely so laterally, the lateral edges narrowly but strongly reflexed. *Elytra* from one-third to two-fifths longer than wide, rather coarsely deeply and sparsely punctate, and distinctly rugulose, especially toward the apex. *Abdomen* coarsely but not very densely punctate, more or less rugulose. Length 14.0–17.0 mm.; width 7.0–8.3 mm.

California (Monterey; Santa Barbara; Los Angeles).

The edges of the elytra, when viewed laterally, are generally very feebly arcuate, sometimes nearly straight. The punctuation of the upper surface is rather constant, but the sculpture of the abdomen varies considerably, a specimen from Santa Barbara before me having the surface smooth, polished, almost devoid of rugulosity, and finely and very sparsely punctate. The elytra are a little more than twice as long as the prothorax in the female, relatively shorter in the male.

C. ovalis Lec.—Ann. Lyc. N. Y., V, p. 131.—Oblong-oval, strongly convex and shining; sides nearly straight in the middle. *Head* very nearly one-half as wide as the base of the prothorax, rather coarsely and densely punctate; antennæ blackish, pale at apex, moderate. *Prothorax* rather short, from three-fourths wider than, to nearly twice as wide as long; sides feebly arcuate, generally convergent from base to apex, very feebly so and sometimes nearly parallel in basal half; base truncate, very feebly sinuate near the angles which are slightly produced posteriorly; disk sparsely but rather strongly punctate toward the middle, densely and very coarsely so laterally, the sides not narrowly reflexed but strongly finely beaded. *Elytra* always distinctly more than twice as long as the prothorax, sometimes feebly inflated behind the middle, unevenly, very coarsely and deeply punctate, the punctures often irregularly coalescent, especially toward apex. *Abdomen* finely, rather sparsely punctate, the punctures subtransverse, very feebly asperate, especially toward the sides. Length 10.0–11.5 mm.; width 5.2–5.7 mm.

Oregon; State of Washington; Vancouver Island; Montana (Bitter Root valley).

Although allied to *abdominalis* this species is very much smaller, and is exclusively northern in habitat. In both, the elytra are strongly rugulose toward apex, but this uneven effect is produced by actual inequality of the surface, the punctures being smaller and scattered over the surface of the wrinkles in *abdominalis*, while in *ovalis* it is the result of actual coalescence of the larger, deeper and more broadly impressed punctures. The elytral punctures are distinctly smaller in the Montana specimens.

C. inæqualis n. sp.—Rather elongate, strongly convex, with the sides parallel and nearly straight, the apex of the elytra very unusually prolonged and acutely rounded; surface strongly shining. *Head* distinctly less than one-half as wide as the base of the prothorax, rather sparsely and finely punctate, more coarsely so anteriorly; antennæ piceous-black almost throughout, rather robust but scarcely at all incrassate toward tip. *Prothorax* about three-fourths wider than long; sides almost parallel and feebly arcuate in basal two-thirds, rounded anteriorly; base truncate, very feebly sinuate laterally, the angles slightly produced and narrowly rounded; disk very minutely and extremely sparsely punctate throughout, the punctures but slightly more evident toward the sides which are very narrowly but strongly reflexed. *Elytra* distinctly more than twice as long as the prothorax, sparsely but very deeply and coarsely punctate, the punctures very widely impressed, producing a very unevenly rugulose appearance toward apex where they are imperfectly coalescent in twos or threes. *Abdomen* polished, excessively minutely feebly and sparsely punctate. Length 13.5 mm.; width 6.2 mm.

California (exact locality unknown).

Although represented by a single specimen, there can be no reasonable doubt that this species is comparatively isolated. In general habitus it resembles *eschsoltzi*, but can at once be distinguished by its very sparse punctuation and radically different elytral setæ, as well as its polished and exceedingly minutely punctate pronotum.

C. robusta Horn.—Trans. Am. Phil. Soc., XIV, p. 296.—Robust, strongly convex, about twice as long as wide; pronotum finely alutaceous; elytra more strongly shining and more piceous-brown in color. *Head* rather small, less than one-half as wide as the prothorax, finely punctate; antennæ very robust, slightly incrassate toward apex; eleventh joint as usual much narrower. *Prothorax* about two-thirds wider than long; the sides parallel and almost straight in basal two-thirds, strongly rounded and convergent anteriorly; base transverse, rather strongly sinuate laterally, the angles being very distinctly produced posteriorly and scarcely at all rounded; disk sparsely and very minutely punctate throughout; side margins narrowly but strongly reflexed. *Elytra* scarcely more than twice as long as the prothorax, very decliv-

ous behind, the apex rather acutely rounded; surface rugulose throughout, especially toward apex, and with three imperfectly defined and very feeble eroded grooves; punctures very minute and sparse throughout. *Abdomen* finely and sparsely punctate, with slight traces of rugulosity. Length 14.0 mm.; width 7.0 mm.

California (Santa Barbara Co.).

The original description of this species was drawn from a series⁹ comprising several distinct forms. The specimen designated by Dr. Horn as "1," judging from the coarseness of the dorsal punctuation, is probably a specimen of *abdominalis* in which the ventral punctuation and rugulosity has become rudimentary. The description here given is taken from a specimen in the cabinet of LeConte, and is distinguished from *abdominalis* by its very fine punctuation of the upper surface. From *elliptica* which has also been confounded with *robusta*, the latter is at once distinguishable not only by its rugulose, but at the same time more convex elytra, with strongly arcuate lateral edges.

C. elliptica Casey.—Cont. Col. N. A., I, p. 46.—Robust in the female, the male very slightly more than twice as long as wide, moderately convex, smooth, strongly shining, the pronotum feebly alutaceous, intense black throughout. *Head* small, very distinctly less than one-half as wide as the prothorax, very finely and somewhat densely punctate; antennæ slender, the outer joints scarcely perceptibly incrassate. *Prothorax* from two-thirds to nearly four-fifths wider than long; sides subparallel or very feebly convergent from the base to slightly beyond the middle, broadly rounded anteriorly; base transverse, the angles feebly prolonged posteriorly; disk excessively finely, very sparsely punctate, the punctures but slightly closer and stronger toward the sides, the lateral edges extremely narrowly and finely reflexed. *Elytra* always much more than twice as long as the prothorax, generally slightly inflated behind the middle, gradually and rather feebly declivous behind; apex acutely rounded; disk nearly smooth, very minutely and sparsely punctate. *Abdomen* smooth, polished, extremely minutely and sparsely punctate. Length 12.5–14.5 mm.; width 6.0–7.4 mm.

California (Kern and San Diego Cos.).

Most of the specimens have the elytra smooth, but in several there is a distinct indication of the three eroded grooves noted under *robusta*, and the same is the case in *ovalis* and *abdominalis*, the erosions constituting a feature which may at some time have characterized a considerable part of the genus. The variation in form is very remarkable, one female having the prothorax distinctly inflated before the middle; the nine representatives agree rigorously,

however, in the nature of the line forming the edges of the elytra, which is invariably straight from a lateral point of view.

C. lata Lec.—New Species Col., 1866, p. 113.—Broadly oval, moderately convex, smooth, subalutaceous. *Head* small, rather coarsely and sparsely punctate; antennæ rather slender, but distinctly incrassate toward apex, the tenth joint slightly longer than wide. *Prothorax* strongly transverse, nearly twice as wide as long, very strongly narrowed from base to apex, the latter not quite one-half as wide as the base which is very strongly bisinuate, the angles acute, not at all rounded and not projecting posteriorly beyond the median lobe; sides strongly, evenly arcuate; disk densely and rather strongly punctured; side margins not reflexed although very finely and acutely beaded. *Scutellum* very small. *Elytra* scarcely one-third longer than wide, two and one-half times as long as the prothorax, the surface smooth, rather dull and just visibly undulated toward apex, somewhat densely and very finely punctate, the punctures not quite as large as those of the prothorax. *Abdomen* shining, sparsely, finely punctate, the punctures denser and rather asperate toward the sides. Length 10.8–11.7 mm.; width 5.3–5.7 mm.

California (Island of San Clemente).

This species represents a very peculiar type, completely isolated from any of those at present known as inhabiting the neighboring continent, and peculiar to the Santa Barbara group of islands. It is immediately distinguishable by its broad evenly oval form, peculiar punctuation and strongly bisinuate base of the prothorax.

Var. insularis.—Similar to *lata* but much narrower, more shining, the head relatively larger and more finely punctate, the prothorax only one-half wider than long, the apex fully one-half as wide as the base, the sides less strongly arcuate. Length 10.0–11.5 mm.; width 4.7–5.1 mm.

California (Island of Santa Cruz).

While conforming to the peculiar typical facies of *lata*, the specimens from Santa Cruz differ to such an extent as to require special designation at least as a variety.

Before discussing the geological changes which the existence of these two northern forms and the genus *Cœlotaxis* apparently reveal to us, it would perhaps be well to note the tendency of the species of *Coniontis*, inhabiting the southern limit of the region near San Diego, to become conspicuously pubescent, as seen in *subpubescens* and the still more aberrant and local form described below as *parviceps*, the latter being probably a degenerative type.

It is well known that a large percentage of all the productions of the islands lying off the coast of California, although having an essentially Californian character, are specifically distinct and strictly

peculiar to them; and it is also a fact that the proportion of endemic species and the relative divergence of type become more pronounced as we proceed southward, until in Guadalupe the endemicity becomes one of the most remarkable of the faunal characteristics.¹

A correlation of these facts seems to indicate that the islands off the coast at one time formed a continuous peninsula, trending almost directly north and south, joining the continent by a broad base between Pt. Concepcion and Cape Vincent,² and tapering to a point at Guadalupe. The fact that the submarine contours exhibit a series of salients in the 500, 1000, 1500 and 2000 fathom curves, extending in the general direction of Guadalupe, gives greater probability to this assumption.

At that time, which was probably at least as early as the beginning of the Pliocene, there was a free intermingling of the continental species characterizing this epoch. Shortly thereafter the peninsula began to subside, interrupting this communication, and, as the islands were successively separated, the quota of individuals remaining upon them gradually diverged under the isolated and special environmental conditions by which they became surrounded; or, in short, have become specifically distinct.

Guadalupe being the first land detached should display the most marked divergence in its productions, although by this hypothesis the essential features should remain as purely Californian as those of the other islands,—facts which have long been well known. It may be objected, however, that as the salient of the 2000-fathom continental contour is separated from the corresponding contour of

¹ Out of 296 species of plants collected by the eminent Californian botanist Mr. E. L. Greene, on the Island of Santa Cruz, 48 are peculiar to the Santa Barbara group, and 28 are peculiar to Santa Cruz alone. In Guadalupe out of 145 known species of plants, 24 are strictly endemic. Except the birds, plants, however, form perhaps the least reliable criterion for the estimation of relative endemicity, as the strongly vitalized and often comparatively indestructible seeds are so apt to be successfully introduced by currents, winds and migratory birds. The real faunistic isolation of these islands will be much more clearly demonstrated by the wingless epigeal species of Coleoptera, and of these there is not a single species at present known from Guadalupe which is not strictly peculiar to the island.

² To one passing along the coast of Santa Barbara Co. and viewing the very bold and precipitous slopes of the Santa Inez Mountains, the desire to liken them—in connection with the present subsidence theory,—to the escarpment of a great fault, is almost irresistible.

the island by an appreciable interval, the island being thus isolated, rising rapidly like a stupendous peak from a great depth, we should have to assume an enormous subsidence, but of course this alone would not invalidate the theory. It may be possible also that as the intermediate region subsided, there was a gradual and counter elevation of the land seaward forming the apex of the peninsula.

The subsidence of the peninsula probably continued through the Pliocene, but it was not until the early Quaternary that the islands near the coast became isolated.¹ It is only natural to assume, therefore, that which we know to be true, that the fauna of these islands should be less modified than that of Guadalupe, although remaining closely allied to it. The ancestral type of *Coniontis lata* has, in Guadalupe, become the densely pubescent genus *Cœlotaxis*, while upon the mainland it seems to have totally disappeared, there being no species at present known which at all resembles *C. lata* or its variety *insularis*.

A thorough exploration of these islands by a scientific entomologist would be fruitful in many interesting results bearing upon their geological history, especially would this be the case with the epigeal species which are not readily transportable by winds and ocean currents. This is perhaps the greatest desideratum in our knowledge of the nearctic fauna.

C. opaca Horn.—Trans. Am. Phil. Soc., XIV, p. 296 — Oblong-oval, strongly convex; sides subparallel; elytra sometimes slightly inflated behind; surface almost smooth, dull and finely alutaceous. Head finely, somewhat densely punctate; antennæ somewhat slender. Prothorax rather short, nearly three-fourths wider than long, the apex fully two-thirds as wide as the base, the latter almost transverse, broadly, feebly sinuate laterally, the angles subacute and scarcely projecting posteriorly beyond the median lobe; sides broadly rounded anteriorly, parallel and nearly straight in basal half; disk finely but deeply, distinctly and very densely punctured toward the sides, very minutely and more sparsely so toward the middle; lateral margin not reflexed, finely beaded. Elytra very distinctly more than twice as long as the prothorax, very finely punctate, the punctures finer and much feebler and sparser than those toward the sides of the pronotum. Abdomen polished, very finely, sparsely punctate. Legs slender. Length 8.3–9.8 mm.; width 4.0–4.6 mm.

California (Owen's Valley); Nevada (Reno).

This species is peculiar to the arid eastern slopes and foot hills of the Sierras, and those specimens from other regions, which have

¹ See an interesting paper bearing upon this subject, by Prof. Joseph LeConte, Bull. Cal. Acad. Sci., II, p. 515.

been recorded under this name, have, in all probability, been incorrectly identified. It is easily recognizable by its rather small size, smooth and strongly alutaceous lustre, extremely dense punctuations of the pronotum, and fine and feeble elytral punctures each of which bears an exceedingly minute seta not projecting beyond the limits of the puncture.

C. punctipes n. sp.—Oblong, moderately convex, feebly shining, smooth or very nearly so. *Head* rather broad, fully one-half as wide as the prothorax, somewhat coarsely and densely punctate; antennæ moderate, the second joint unusually long and about three-fourths as long as the third. *Prothorax* rather short, about two-thirds wider than long, the apex fully three-fourths as wide as the base, the latter transversely truncate, very feebly sinuate near the basal angles which are not at all rounded, and which project posteriorly distinctly beyond the median portion; sides evenly, rather strongly arcuate throughout, the widest part of the disk being near the middle; disk very finely and sparsely punctate toward the middle, the punctures becoming rapidly extremely coarse and somewhat dense near the sides, the lateral edges very finely beaded. *Elytra* very distinctly more than twice as long as the prothorax, finely feebly and sparsely punctate, the punctures denser and much coarser toward base near the sides. *Abdomen* very minutely, sparsely punctate. *Legs* rather slender, the femora very coarsely, deeply and rather densely punctured. Length 9.5 mm.; width 4.3 mm.

California (San Bernardino Co.).

A rather remarkable species, readily distinguishable from any other by the extremely coarse punctuation of the lateral portions of the pronotal disk and of the femora. In the type, the base of the prothorax is narrower than the middle portions, but this is in all probability an abnormal variation.

C. elongata n. sp.—Oblong-elongate with the sides straight and parallel, moderately convex, strongly polished, the pronotum very faintly subalutaceous, smooth. *Head* very minutely and sparsely punctured behind, the punctures becoming denser and much coarser on the epistoma; antennæ moderate. *Prothorax* elongate and strongly developed, from less than one-third to two-fifths wider than long, the apex about two-thirds as wide as the base, the latter transverse, very broadly, feebly sinuate laterally, the angles subacute but not distinctly more prominent than the median parts; sides broadly arcuate anteriorly, nearly parallel in basal two-thirds; disk extremely minutely, sparsely punctured toward the middle, the punctures becoming rapidly rather coarse, deep and distinct, but still somewhat sparse, near the sides; lateral edges finely but strongly beaded. *Elytra* about twice as long as the prothorax, sparsely, finely punctate, the punctures distinct, and generally rather larger than those toward the sides of the pronotum. *Abdomen* polished, very finely and sparsely punctured. Length 12.5–15.0 mm.; width 5.1–6.8 mm.

California (Napa and Humboldt Cos.).

A well-marked species allied to *viatica*, but readily identified by its larger size, much longer prothorax and coarser punctuation. I took a large series on the low ground bordering the tule lands near Benicia; when living it is very strongly pruinose.

C. viatica Esch.—Zool. Atl. III, p. 7.—Elongate, parallel, strongly convex, shining, the pronotum rather strongly alutaceous; surface nearly smooth. *Head* generally somewhat finely and sparsely punctured; antennæ rather robust. *Prothorax* from one-half to three-fifths wider than long, the apex about two-thirds as wide as the base, the latter subtruncate, broadly, very feebly sinuate laterally, the basal angles subacute and generally projecting posteriorly very slightly beyond the median portions; sides generally strongly convergent from base to apex, distinctly and evenly arcuate, sometimes slightly more strongly arcuate before the middle; disk extremely finely punctate throughout, the punctures but moderately dense toward the sides, the lateral edges very minutely beaded. *Elytra* always much more than twice as long as the prothorax, very sparsely and minutely punctured throughout. *Abdomen* very sparsely and extremely minutely punctured. *Legs* slender. Length 10.0–13.0 mm.; width 4.2–5.8 mm.

California (San Francisco).

In the large series of seventeen specimens before me, there is none which can be positively asserted to have been taken in any other locality than that indicated; it appears to be a species peculiar to the sandy coast region, perhaps extending down to Monterey or Santa Barbara. *Viatica* is very readily known by its slender parallel form and very minute punctuation; from *elongata* it may be separated at once by its much shorter prothorax and very much more pronounced longitudinal convexity.

C. eschscholtzi Mann.—Rev. Zool., 1840, p. 138; *affinis* Lec.: Ann. Lyc., V, p. 130.—Oblong-oval, rather strongly convex, moderately shining, the pronotum strongly alutaceous; elytra frequently slightly conical. *Head* anteriorly somewhat coarsely and densely punctate; antennæ rather robust. *Prothorax* from one-half to two-thirds wider than long, the apex somewhat feebly sinuate and rather less than two-thirds as wide as the base, the latter transverse or very feebly arcuate, moderately sinuate laterally, the basal angles acute and slightly prominent posteriorly; sides generally rather strongly arcuate anteriorly, more nearly straight toward base; disk very finely and rather sparsely punctate except toward the sides, where the punctures become rather coarse and denser; lateral edges with a thick convex bead bordered internally by a fine deep groove. *Elytra* always distinctly more than twice as long as the prothorax, rather densely, very coarsely and deeply punctate, the punctures unevenly subcoalescent, producing a strongly

rugulose appearance especially toward apex. *Abdomen* somewhat alutaceous, very finely, sparsely punctured. *Legs* slender and rather long. Length 10.4–14.0 mm.; width 5.0–6.5 mm.

California (San Francisco).

This species also appears to be confined to the coast regions about San Francisco, where it is very abundant. In its normal state, the setæ growing from the elytral punctures are always long and distinct, and the original type of *affinis* does not differ in the slightest character from the species described by Mannerheim as inhabiting the immediate locality alluded to. The setæ are, however, liable to be broken off or rubbed out of the punctures, which will account for several errors in the books.

C. nemoralis Esch.—Zool. Atl. III, p. 8.—Oblong-oval, moderately convex, shining, the pronotum generally alutaceous; elytra often subconical. *Head* rather small, very coarsely, deeply, somewhat densely punctate; antennæ rather slender, the eleventh joint but slightly narrower than the tenth. *Prothorax* rather short, from three-fifths to three-fourths wider than long, the apex about two-thirds as wide as the base, the latter nearly as in *eschscholtzi*, but with the basal angles generally a little more abruptly and distinctly prominent posteriorly; sides broadly rounded anteriorly, straighter and more nearly parallel toward base; disk finely but deeply, distinctly and not very sparsely punctate toward the middle, the punctures becoming gradually quite coarse and dense toward the sides; lateral edges with a moderately thick convex bead, often abnormally sinuate near the basal angles. *Elytra* a little more than twice as long as the prothorax, coarsely and not very densely punctate, strongly rugulose from the coalescence of the punctures toward apex, but very feebly so toward base, the punctures generally very unevenly distributed. *Abdomen* polished, very finely, sparsely punctate, the pubescence rather long and very fine. Length 6.8–9.8 mm.; width 3.5–4.5 mm.

California (San Francisco).

A very small species, confined to the same regions as *viatica* and *eschscholtzi* and also very abundant. Its resemblance to the latter of these species is so marked, that mistakes are very liable to occur in identifying the extremes of each; with large series, however, it is readily seen to differ by certain constant characters, among which may be mentioned the smaller, more coarsely punctured head, very slightly shorter prothorax, and distinctly more finely and sparsely punctured elytra, the setæ of both the elytra and abdomen being a little longer, more evident and more persistent; it is also constantly much smaller in size and slightly less convex. It varies remarkably in size.

C. puncticollis Lec.—Ann. Lyc. N. Y., V, p. 131.—Slender, parallel, very convex and subcylindrical, pointed behind, subalutaceous, smooth. *Head* moderate in size, rather finely, densely punctate; antennæ rather short, very robust, the tenth joint distinctly transverse. *Prothorax* from one-half to two-thirds wider than long, the apex two-thirds as wide as the base, the latter almost transversely truncate, the basal angles but very slightly prominent posteriorly; disk very finely and extremely densely punctate laterally, rather abruptly much more sparsely so along the middle; lateral margins very minutely and acutely beaded. *Elytra* distinctly more than twice as long as the prothorax, very minutely, feebly punctate, generally with several extremely feeble and rudimentary longitudinal costæ, which are more visible toward the suture and rather narrowly separated, the crests of the costæ almost impunctate, the intervals rather densely and confusedly so. *Abdomen* strongly convex, sparsely and extremely minutely punctate. *Legs* very short, slender, generally more or less rufescent. Length 7.6–10.0 mm.; width 3.3–4.2 mm.

California (San Francisco, Benicia).

This very peculiar species is one of the smallest of the genus. The elytral costæ are generally almost completely obsolete, but even when entirely invisible the punctures are left distributed in very imperfectly defined longitudinal streaks or patches. The hairs growing upon the elytra are rather short, but extend far beyond the limits of the exceedingly small and feeble punctures. It is rather abundant, and appears to be limited to the same region as *viatica*.

C. alutacea n. sp.—Oval, strongly convex, dull throughout. *Head* somewhat finely, moderately densely punctate; antennæ robust. *Prothorax* fully three-fourths wider than long, the apex strongly sinuate and about three-fifths as wide as the base, the latter transverse and broadly, feebly bisinuate, the basal angles acute and projecting posteriorly but slightly beyond the broadly arcuate median lobe; sides rather strongly arcuate anteriorly, generally a little straighter toward base; disk rather sparsely, very finely punctate toward the middle, the punctures becoming gradually much larger deep, very distinct and moderately dense laterally; side margins finely but strongly beaded, the bead bordered internally by a coarse deep groove. *Elytra* fully two and one-half times as long as the prothorax, rather abruptly and acutely pointed behind, densely punctate, the punctures rather large and distinct, very confusedly coalescent toward apex producing a densely rugulose appearance, which becomes much less pronounced anteriorly. *Abdomen* polished, very finely, sparsely punctate. *Legs* slender. Length 9.0–11.0 mm.; width 4.8–5.3 mm.

Nevada (Reno).

The series of five specimens indicates but slight variability, and the species may readily be distinguished from *opaca* by its sparser pronotal punctures, and its much more coarsely punctate and rugu-

lose elytra. It appears to be the inland representative of the maritime *eschscholtzi*.

C. subpubescens Lec.—Ann. Lyc. N. Y., V, p. 131.—Oblong-elongate, parallel, somewhat depressed, feebly shining throughout. *Head* moderate in size, very coarsely, deeply and not very densely punctured; antennæ long and slender, distinctly incrassate near the apex. *Prothorax* about two-thirds wider than long, the apex moderately sinuate, nearly two-thirds as wide as the base, the latter broadly truncate and straight, the basal angles abruptly produced and distinctly prominent posteriorly, acute; sides arcuate, straighter toward base; disk finely but distinctly, moderately densely punctate, the punctures sparse and rather finer toward the middle; lateral margins strongly but finely beaded and finely grooved within the bead. *Elytra* distinctly more than twice as long as the prothorax, broadly, feebly and unevenly undulated, the undulations becoming strong coarse rugulosities toward apex; punctures fine, not very dense, each with a very long fine recumbent hair. *Abdomen* polished, smooth, sparsely, very finely punctured. *Legs* well developed, very slender. Length 9.2–10.8 mm.; width 4.2–4.8 mm.

California (Marin, Santa Clara and San Diego Cos.).

This species, although assigned here to another section of the genus because of its conspicuous pubescence, is in reality very closely allied to *abdominalis* and *robusta*, and in the original type the three eroded grooves on the elytra, characterizing that group of species, are clearly but of course very faintly visible; another character allying it to *abdominalis* is the nature of the elytral rugulosity, which is not caused by the coalescence of deep coarse punctures; in *subpubescens* the punctures toward apex are fine and distributed over the surface of the convexities. It is distributed throughout the maritime districts of California but appears to be rather rare.

C. montana n. sp.—Oblong-elongate, rather feebly convex, sometimes distinctly flattened above, rather feebly declivous behind and gradually, acutely pointed; surface strongly alutaceous throughout; elytra frequently conical. *Head* sparsely but coarsely punctate, the punctures finer posteriorly; antennæ moderate. *Prothorax* well developed, from three-fifths to three-fourths wider than long, almost as in *subpubescens* but with the pubescence shorter; punctures excessively fine toward the middle. *Elytra* fully two and one-half times as long as the prothorax, feebly undulated, subrugulose toward apex, the punctures throughout rather sparse and extremely fine, each having a long somewhat coarse subrecumbent fulvous hair. *Abdomen* very feebly sub-alutaceous, finely, sparsely punctate. *Legs* moderate. Length 10.8–13.0 mm.; width 5.0–6.3 mm.

California (Lake Tahoe—elevation 6300 feet).

A good series of eight specimens shows that *montana*, although allied to *subpubescens*, is abundantly distinct; it differs in its much larger size, shorter, sparser and less conspicuous pubescence, and in the nature of the elytral punctuation which distinguishes it at once from that species. The punctures are generally distinct and deeply impressed, but toward apex they gradually become smaller, and finally extremely fine and feeble, and,—although in reality separated by about the same interval between centres—apparently much sparser. The majority of specimens display very distinct traces of the three eroded grooves.

C. pallidicornis n. sp.—Oblong-elongate, parallel, moderately convex, smooth, strongly alutaceous throughout. *Head* somewhat coarsely but not very densely punctate anteriorly; antennæ very slender, eighth joint much longer than wide, tenth not quite as wide as long. *Prothorax* moderately narrowed from base to apex, from one-half to three-fifths wider than long, the sides moderately and almost evenly arcuate; base transverse, feebly sinuate at the sides, the basal angles being right, very narrowly rounded and but very slightly prominent posteriorly; disk very minutely, sparsely punctate toward the middle, the punctures gradually coarser and quite distinct, but not very dense, laterally; marginal bead very fine. *Elytra* distinctly more than twice as long as the prothorax, almost smooth but very dull, with feeble traces of rugulosity, somewhat sparsely and very finely punctate, the punctures becoming finer toward apex, each bearing a stiff subrecumbent fulvous seta which is rather short and inconspicuous, although projecting far beyond the limits of the puncture. *Abdomen* sparsely, very minutely punctured. Length 8.2–9.0 mm.; width 3.8–4.1 mm.

Southern California.

Allied to *montana* in the gradual decrease in size of the punctures toward the apex of the elytra, but quite distinct in its smaller size, smoother surface and very much shorter and less conspicuous pubescence. It is much more elongate and less convex than *opaca*, and has the punctures toward the sides of the pronotum coarser and very much sparser. The antennæ and tarsi are testaceous throughout, the legs piceous.

C. genitiva n. sp.—Oblong-elongate, parallel, with the sides straight, rather strongly convex, the elytra rather shining, the pronotum strongly alutaceous. *Head* well developed, coarsely deeply and rather densely punctate anteriorly, much more finely and sparsely so posteriorly; antennæ rather long and very slender, the third joint much more than twice as long as the second, the tenth much longer than wide and but slightly wider than the

eighth. *Prothorax* rather long and well developed, scarcely one-half wider than long; apex about two-thirds as wide as the base, the latter transverse, broadly, feebly bisinuate, the basal angles acute but not very prominent posteriorly; sides rather strongly arcuate anteriorly, becoming parallel and nearly straight in basal three-fifths; disk very finely, sparsely punctate, the punctures becoming more distinct but still fine and rather sparse toward the sides; lateral margins coarsely beaded. *Elytra* but very slightly more than twice as long as the prothorax, not very strongly declivous and rather acutely rounded behind, very feebly subrugulose especially toward apex, the punctures sparse but rather large, deeply impressed and very distinct, each bearing a very fine elongate recumbent seta, the vestiture not at all conspicuous. *Abdomen* sparsely but unusually coarsely and distinctly punctured. Femora coarsely but sparsely punctate. Length 13.0 mm.; width 5.4 mm.

California (Lake Co.) Mr. Fuchs.

This species in general form can be compared only with *elongata*, but is distinguished from it not only by its longer elytral setæ, but by its distinctly different antennal structure, the third joint in *elongata* being less than twice as long as the second, and the tenth joint a little wider than long. In the type the two inner of the three eroded grooves are just traceable.

C. parallela n. sp.—Oblong-elongate, parallel, with the sides straight, rather depressed, the elytra slightly shining, the pronotum very strongly alutaceous. *Head* rather densely, somewhat finely punctate, the antennæ moderate. *Prothorax* rather long and well developed, scarcely one-half wider than long, the apex nearly three-fourths as wide as the base, the latter broadly, rather strongly bisinuate, the median lobe broadly arcuate, the basal angles acute and not rounded but not projecting posteriorly beyond the median lobe; sides moderately arcuate anteriorly, nearly parallel and straight in basal two-thirds; disk coarsely, very conspicuously and moderately densely punctured, more sparsely and finely but still very distinctly so toward the middle; marginal bead rather fine. *Elytra* about twice as long as the prothorax, feebly rugulose, quite distinctly so toward apex, rather strongly, unevenly and moderately densely punctate, the punctures rather coarse, each bearing a long, subrecumbent, fulvous seta, the vestiture slightly conspicuous. *Abdomen* sparsely, very finely and feebly punctate. Length 11.0 mm.; width 5.0 mm.

California (Mendocino Co.).

There is a very feeble trace of the approximate elytral ridges mentioned under *puncticollis*, but otherwise there is no resemblance between these species; in fact *parallela* is quite an isolated form, there being none other with which I can compare it, the rather depressed parallel form, distinct pubescence and coarse pro-

notal punctuation readily distinguishing it from any other. Perhaps it is most closely allied to *subpubescens*, but differs in its longer prothorax and very much coarser and sparser elytral punctures.

C. parviceps n. sp.—Elongate oval, moderately convex, rather dull and alutaceous throughout; elytra feebly undulato-rugulose, especially toward apex. *Head* small, coarsely, deeply, moderately densely punctate; antennae moderate, third joint scarcely more than one-half longer than the second, tenth triangular, as wide as long. *Prothorax* one-half wider than long, strongly narrowed from base to apex, the latter scarcely more than one-half as wide as the former; apex very deeply sinuate; base very broadly emarginate throughout the width, the basal angles being acute and posteriorly prominent; sides evenly and rather strongly arcuate; disk rather sparsely punctate, the punctures distinct toward the middle, rather denser and decidedly coarse laterally; side margins extremely minutely, acutely beaded. *Elytra* but slightly more than twice as long as the prothorax, extremely finely, not very densely punctate, the punctures much finer than those near the sides of the pronotum and becoming, toward apex, excessively minute and feeble. *Abdomen* rather strongly convex, very finely, sparsely punctate, each puncture bearing a long hair. Length 7.0–8.0 mm.; width 3.4–4.0 mm.

California (San Diego).

The punctures of the pronotum and elytra bear each a long rather coarse fulvous seta, the vestiture being closely recumbent and very conspicuous. This is a small and comparatively isolated species.

C. setosus n. sp.—Oval, strongly convex, rather shining, the pronotum slightly alutaceous; elytra extremely feebly undulato-rugulose toward apex. *Head* well developed, finely and sparsely punctured; antennae long and somewhat robust, third joint twice as long as the second, tenth nearly as wide as long, strongly obtrapezoidal. *Prothorax* two-thirds wider than long, the apex two-thirds as wide as the base, the latter broadly, very feebly arcuate, broadly distinctly sinuate laterally, the basal angles right, not rounded and projecting posteriorly slightly beyond the median portions; sides almost evenly and rather feebly arcuate; disk sparsely and extremely finely punctate toward the middle, the punctures becoming much denser, rather strong and distinct laterally, the setae very short and inconspicuous; side margins finely and acutely beaded. *Elytra* fully two and one-half times as long as the prothorax, evenly and unusually obtusely rounded behind, densely and rather strongly punctate, the punctures much larger than any of those of the pronotum, and, toward apex, becoming rather fine and more feeble, each with a moderately long, robust, erect and fulvous seta, the vestiture dense but not conspicuous. *Abdomen* finely, sparsely punctate. Length 10.0 mm.; width 5.0 mm.

Idaho (Cœur d'Aléne). Lieut. Jas. A. Leyden.

This species is readily distinguishable by its oval, strongly convex form, and peculiarities of the elytral pubescence. It is probably

one of the derivatives of the ancient type of *ovalis*, which inhabits nearly the same region. The unique type exhibits decided traces of a number of feeble approximate elytral ridges similar to those of *puncticollis*. The elytra become strongly alutaceous and rather coarsely creased toward apex, and the very feeble undulating inequality of the surface, which could scarcely be called rugulosity, is not caused by partial coalescence of the punctures. In *ovalis* the elytra are polished throughout, very coarsely, deeply punctate, the punctures not becoming finer toward apex, where they are confusedly coalescent causing a strongly marked rugulosity.

CONIONTELLUS n. gen. (Coniontini).

The species described by LeConte as *Coniontis obesa*, differs structurally from the normal members of that genus in having the eyes completely divided. If this were the only difference which could be perceived, we might perhaps be warranted in considering *obesus* and its allies as a mere section of *Coniontis*, but as this structural peculiarity is supplemented by several other characters, I have deemed it more proper to separate the species mentioned under another name.

Coniontellus differs from *Coniontis* in having the eyes completely divided, the antennæ shorter, more slender, with a much greater development of the second joint and a wider eleventh joint, and in the form of the anterior tibiæ, these being broader, shorter, more strongly compressed and triangular.

The genus is peculiar to the high arid mountainous table lands and valleys of the Rocky Mountain system, and does not extend westward beyond the Sierras. The species are all small and are apparently much less numerous than those of *Coniontis*, those which are known to me may be distinguished as follows:—

Setæ of the elytra longer erect and distinct; pronotal punctures very coarse, with but little tendency to longitudinal coalescence.

Elytral setæ long and conspicuous, coarse and fulvous, nearly as long as the third joint of the posterior tarsus; body more robust, the elytra always rather strongly inflated behind; scutellum very small.....**inflatus**

Elytral setæ shorter, finer and sparser, not more than one-half as long as the third joint of the posterior tarsus; body less robust and more parallel; scutellum rather large.....**obesus**

Setæ of the elytra very short, robust and pointed, recumbent and not projecting distinctly beyond the confines of the punctures; pronotal punctures finer, denser and more longitudinally coalescent.....**subglaber**

C. inflatus n. sp.—Robust, strongly convex and shining, the elytra inflated. *Head* rather less than one-half as wide as the prothorax, not very coarsely but densely punctate, the punctures usually sparser toward the middle; epistoma extremely densely punctured. *Prothorax* about twice as wide as long, the apex nearly three-fourths as wide as the base, the latter broadly truncate, the angles narrowly and abruptly produced posteriorly, very acute; sides feebly arcuate, more strongly so near the apex; disk moderately densely, very coarsely and deeply punctate laterally, more sparsely and much more finely so near the middle; side margins very finely, acutely beaded. *Elytra* about three times as long as the prothorax, and, at posterior third, distinctly wider, rather coarsely but not densely punctate, the punctures becoming much smaller toward apex. *Abdomen* sparsely but rather strongly punctate. Length 6.5–7.4 mm.; width 3.4–3.9 mm.

Nevada (Reno).

Differs considerably from either *obesus* or *subglaber* in its much more robust form, inflated and relatively longer elytra, and the much more conspicuous setæ toward the apex of the latter. The scutellum in the three specimens before me is much smaller and more acute than in *obesus*, and very slightly smaller than in *subglaber*.

C. obesus Lec.—*Coniontis ob.*: Ann. Lyc. N. Y., V, p. 131 *nota*.—Robust, subparallel, convex, rather strongly shining. *Head* well developed, finely, rather densely punctate, more sparsely so near the middle. *Prothorax* fully four-fifths wider than long, the apex three-fourths as wide as the base, the latter transversely truncate, the angles very narrowly, abruptly and moderately produced posteriorly, very acute; sides feebly arcuate; disk rather densely and decidedly coarsely punctate, less coarsely and more sparsely so toward the middle; side-margin very fine and acute, extremely narrowly reflexed. *Elytra* nearly two and one-half times as long as the prothorax, abruptly narrowed in apical third which is angulate and acutely rounded at apex; disk rather coarsely, deeply and moderately densely punctate, the punctures a little more sparse and feeble toward apex. *Abdomen* sparsely, rather finely but very distinctly punctured, the punctures rounded. Length 6.0 mm.; width 3.1 mm.

Colorado (Long's Peak). Cab. LeConte.

The description refers to the original type which is unique. The elytral setæ toward apex, when viewed along a line tangent to the surface, are seen to be rather fine, erect, not dense and about one-half as long as the third joint of the posterior tarsus. The lateral pronotal punctures are coarse, very slightly longer than wide, and not at all coalescent.

C. subglaber n. sp.—Form as in *obesus*. *Head* moderate, very finely, densely punctate. *Prothorax* nearly as in *obesus*, the disk unevenly, very

densely punctate, the punctures finer, elongate and tending to coalesce longitudinally, finer, much sparser and more rounded near the middle; side-margin very fine and acute, not distinctly reflexed. *Elytra* nearly as in *obesus* but more finely punctate, each puncture bearing a very minute seta. *Abdomen* finely and sparsely punctate. Length 5.8–6.8 mm.; width 2.9–3.4 mm.

Montana (Helena). Mr. Wickham.

The elytral setæ in this species are exceedingly minute, robust and pointed, subrecumbent, and do not project much beyond the external edge of the puncture. It resembles *obesus* very much, but may be distinguished not only by the character of the vestiture, but by the different punctuation.

TENEBRIONINÆ.

The fundamental characters upon which the various tribes of this great subfamily are at present based, seem to be unsatisfactory to a considerable degree, and yet the difficulties involved in striving to present a series of genera in linear form, which can no more lend themselves to such treatment than the stars disseminated through the firmament, is of course insurmountable. If, however, our own genera are difficult of taxonomical arrangement, the European genera are still more so, and are in a condition of decidedly unstable equilibrium.

It is evident that one source of confusion may be the tenacious retention, as a tribal character, of the sexual modification of the anterior tarsus. Our own genera of Blapstini prove conclusively that this is of no value whatever, either in the separation of tribes or of genera, as it is subject to complete extinction even in Blapstinus itself, as will be shown under that genus. Relegating this very alluring but misleading character to the background therefore, I believe it is possible, by giving greater prominence to other well known but insufficiently appreciated characters, to bring about a more harmonious grouping of the genera.

In examining the table on page 372 of the recent classification of LeConte and Horn, which is essentially a repetition of that given by LeConte in the first edition, we discover several inconsistencies, as follows:—

- 1 The character relating to the dilatation of the head, in separating tribes V and VI from I–IV, is evidently of no importance, as in tribe V the head in *Opatrinus* is not as prominent at the sides as in *Argoporis*, and many other exceptions might be cited.

2 It is difficult to draw any rigid distinction between the form of tarsal vestiture of the Amphidorini and Upes, and,

3 It does not seem proper to class together genera like *Tenebrio*, with the tarsi very sparsely and coarsely spinose beneath; and the Upes, in which they are densely and finely pubescent.

After a prolonged and careful study of the genera involved, I have been forced to the conclusion that a purely natural tribal classification, which shall include no exceptional cases, is a practical impossibility, but, at the same time, the following arrangement of the first few tribes of the subfamily seems, at least with the material at hand, to be less objectionable in this respect than any which I have been able to consult. The few known exceptions will be noted below :—

Posterior coxæ transverse, other characters as stated (Class. Col. N. A. p. 372).

Fourth joint of the maxillary palpi triangular or securiform.

Epipleuræ attaining the sutural angle.

Tarsi with fine, usually silken pubescence beneath.....UPINI

Tarsi spinose or setose beneath.

Elytra widely embracing the body.....BLAPTINI

Elytra narrowly embracing the body.

Inflexed sides of the elytra only in part composed of the epipleuræ. .

Middle and hind coxæ equally and widely separated; elytra strongly inflated.....PIMELIINI

Middle coxæ narrowly, posterior very widely separated; elytra subequal in width to the prothorax, the latter generally loosely articulated and not overlapping the elytra.

Head long, the eyes distant from the prothorax.....SCAURINI

Head short and transverse; eyes near the prothorax.....EULABINI

Middle and hind coxæ equally and narrowly separated, the prothorax and elytra in very close contact throughout, the base of the former usually overlapping at the sides.....PEDINI

Inflexed sides composed entirely of the epipleuræ; posterior coxæ generally narrowly separated.....TENEBRIONINI

Epipleuræ not attaining the sutural angle.

Head strongly dilated and prominent at the sides before the eyes.

OPATRUMINI

Head not prominent at the sides; body pubescent.....AMPHIDORINI

Fourth joint of the maxillary palpi elongate-oval, more or less finely acuminate.....LEICHENINI

The only exceptions which it is possible to cite at present, are the genera *Dendarus*¹ and *Colpoptus* of the Eulabini, which have the

¹ I am uncertain which of the two names *Eulabis* and *Dendarus* to apply to the tribe; they were both published in 1829.

tarsi densely clothed beneath with long flavate pubescence, and *Heterophilus* of the *Opatrumini*,¹ which does not have the head prominent at the sides. The remaining characters in these genera are thoroughly those of the tribes in which they are placed.

In this scheme the *Upini* comprise the *Upes* and also the European *Menephilus*.

The *Blaptini* remain as at present organized.

The *Pimeliini* constitute a very homogeneous and interesting tribe, composed of the European genera at present assigned to it. The epipleuræ are extremely narrow throughout the length of the elytra, but seem to be invariably entire. The fourth joint of the maxillary palpi is unusually small. *Sepidium* does not belong anywhere near the *Pimeliini*, where it is placed in the European catalogues, but is a member of the *Asidinæ*.

The *Scaurini* will include *Scaurus*, *Cephalostenus*,² *Cerenopus* and *Argoporis*, rendering necessary the formation of three distinct groups or subtribes. *Akis* is in no way related to *Scaurus*, but belongs to the *Asidinæ*, as is also the case with *Morica* and *Cyphogenia*.

The *Eulabini* will include *Eulabis*, *Dendarus*, *Colpotus*, *Helioptates*, *Phylax*—the resemblance of this genus to *Eulabis* is quite marked—*Sinorus*, *Isocerus*, *Micrositus*, and *Litoborus*.

The *Pedinini*, as here considered, will consist of the two genera *Pedinus* and *Platyscelis* only; these are quite isolated, not only by the structural characters already given, but also in general habitus. In this tribe the sexual modification of the legs in the male becomes extreme.

The *Tenebrionini* will comprise the genera *Tenebrio*, *Alæphus*, *Eupsophus*, *Opatrinus* and the *Blaptini*—including *Cabirus*—as well as the European *Calcar*, *Scleron* and *Pachypterus*. *Doliema* Pasc. (*Adelina* Lec. *nec* Woll.) and *Bius*³ should be removed to the *Ulomini*. It will be noted in extenuation of this radical change that the general habitus of *Tenebrio* is very satisfactorily reproduced in

¹ This name is proposed in order to distinguish the tribe from the group *Opatrini*, rendered necessary by the word *Opatrinus*.

² I have not been able to study this genus in nature but infer that it is properly placed.

³ In *Bius* the reflexed elytral edges and epipleuræ terminate abruptly before attaining the apex; this and many other characters ally it to *Uloma* and exclude it from the *Tenebrionini*. The European *Dilamus* is closely related.

the Blapstini, and especially in *Mecysmus*, but *Eupsophus* appears out of place in any of the tribes thus far proposed. The genera may be grouped as follows:—

Eyes more prominent than the sides of the head, the latter prolonged in front of them **EUPSOPHI**

Genera *Eupsophus* and *Alæphus*

Eyes less prominent than the sides of the head.

Eyes not entirely divided.

Eyes at a considerable distance from the prothorax **TENEBRIONES**

Genera *Culcar* and *Tenebrio*

Eyes very near the prothorax; head much shorter, transverse... **OPATRINI**

Genera *Opatrinus*, *Scleron* and *Pachypterus*

Eyes entirely divided **BLAPSTINI**

Genera as given below

The Opatrumini will include *Opatrum*, *Gonocephalum*, *Scleropatrum*, *Pseudolamus*, *Melambius*, *Heterophilus*, *Opatroides*, *Hadrus* and *Ephalus*. Of these genera, the only ones found within the nearctic region are *Gonocephalum* and *Ephalus*. Our single representative of *Gonocephalum* was described by LeConte as *Blapstinus latifrons*; it is entirely congeneric with the European forms, and appears to be not only rare but very restricted in habitat; it occurs in Vancouver Island. *Ephalus latimanus* is well known in cabinets, but is somewhat rare; it is found in the Atlantic region, and is not very closely related to any other genus.

The Amphidorini will of course remain as at present known.

The Leichenini, as here considered, consist of a few singular genera previously distributed among, or forming several groups of, the Opatrini of Lacordaire, but which have in common a very strong bond of affinity; in fact in spite of the difference in vestiture *Ammodonus* and *Microzoum* are comparatively closely allied. It will be noticed that the constancy and consequent taxonomic value of the epipleuræ becomes completely lost in the present tribe,—as is also the case in the Ulomini. The genera may be defined as follows, those which are not nearctic being indicated by an asterisk:—

Anterior tibiæ strongly dentate or produced externally at or near the apex.

Eyes nude, completely divided or extremely nearly so; epipleuræ entire.

Anterior tibiæ very short and robust; eyes rather finely faceted.

***Microzoum**

Anterior tibiæ slender; eyes much larger, coarsely faceted.

Ammodonus

Eyes emarginate anteriorly, coarsely faceted, the facets separated by coarse, and very strongly elevated carinæ; epipleuræ imperfect, wide near the base, very narrow near the apex and completely obsolete in the middle.

***Leichenium**

Anterior tibiæ very short, broadly triangular, not dentate and devoid of denticiform process.

Eyes well developed, not emarginate, the lenses separated by narrow, acute and very strongly elevated carinæ; epipleuræ completely obsolete throughout **Cnemeplatia**

Eyes obsolete, represented by a small deep fovea on the subacute lateral margin near the base, the bottom of the fovea apparently sensitive; epipleuræ very faintly defined near the base only **Alaudea**

By this arrangement the Pimeliini and Pedinini are entirely, and the Eulabini and Opatrumini chiefly, characteristic of the eastern hemisphere, while the Upini and Tenebrionini are most numerous in the western world. The Amphidorini are peculiar to western North and South America, while the Blaptini, Scaurini and Leicheniini are almost equally represented in the eastern and western continents.

ELEODES Esch.

The genera of Blaptini are closely allied and, in general, mutually distinguishable only by some single structural difference; even this is not always of definite and unequivocal value. The European *Prosodes*, for example, is extremely close to *Eleodes* and differs, as far as can be clearly perceived, only in the strong compression of the four posterior tarsi. *Gnaptor* differs only in the complete extinction of one of the spurs of the anterior tibiæ and the abnormal development of the remaining one, a character which the casual study of our species of *Eleodes* will tend to prove of doubtful importance. I think, also, that it will be found difficult to state any absolutely constant difference between the females of *Blaps* and *Eleodes*. It is true that the mentum varies, but in this respect the difference in the form of this organ among the various species of *Eleodes*, is vastly greater than that between *Blaps mortisaga* and *Eleodes suturalis*. The form of the mentum is in fact of very little value in this tribe, or indeed in many others of the Tenebrionidæ, as an examination of the species of *Eulabis* or the sexes of *Uloma* will amply demonstrate.

Before describing several distinct forms of *Eleodes* which have

come into my possession during the past five or six years, it is desirable to make a few observations:

1 The description of *E. quadricollis* given by Mannerheim reads thus, in regard to the arrangement of the elytral punctures: "Mas: elytris . . . dense striato-punctatis, punctis granuliferis. Femina: elytris . . . obsolete striato-punctatis."

I have a specimen taken by myself near San Francisco, the locality assigned by Mannerheim to *quadricollis*, which coincides exactly with the above-described male of that species, and I therefore regard it as an authentic type; its length is 15 mm. while that of Mannerheim's type is 7 lin.

The description of *quadricollis* given by Horn (Rev. Ten., p. 309) reads as follows, in regard to the elytra: "Sculpture consisting of punctures sometimes fine, at others rather coarse, rather densely but irregularly placed and *never muricate, never arranged in rows.*" The introduced italics indicate that the author quoted has mistaken some other species—probably that described below as *estriatus*—for the true *quadricollis*.

It should also be stated that a very large series of *gentilis* which I took at San Diego, shows quite clearly that this species should be associated with *quadricollis* and *vicinus*, and is out of place in the present arrangement.

Finally the species named *vicinus* by LeConte is distinct from *quadricollis* in having much finer punctures, which are sparser and much less asperate toward the sides, and also in several other characters, among which may be mentioned the form of the prothorax,—widest at anterior third in *quadricollis* and just before the middle in *vicinus*,—the much longer posterior tarsi in the male of *vicinus*, and the form of the penis which is very much more slender and attenuate in *quadricollis*. *Vicinus* is peculiar to the Gila Valley of Arizona, a region zoologically quite distinct from that inhabited by *quadricollis*.

2 The species described by me as *arcuatus* (Cont. Col. N. A., p. 47) belongs near *carbonarius*, and is not at all similar to *extricatus*. It will be observed that in *extricatus* the elytral punctures are arranged in closely approximate and equally pronounced series, giving a peculiar appearance to this species. *Cognatus* Hald. is simply a specimen in which the punctures are finer, but the disposition of them is precisely the same and *cognatus* is truly a synonym.

In *carbonarius* the elytral punctures are arranged in widely dis-

tant and strongly pronounced rows, with a very few fine punctures scattered along the intervals,—a radically different arrangement which is reproduced in *arcuatus*. *Debilis* and *arcuatus* while allied to *carbonarius* are easily distinguishable from it and from each other; they are, in fact, specifically valid in every sense and should be restored to the list.

3 The species *longicollis* and *giganteus* when normal have the elytra smooth, polished and very minutely, sparsely punctate, the punctures being distributed without order, but occasionally the elytra have closely approximate series of large very shallow dents, which are not true punctures, for on close examination the true punctures are still seen to be distributed irregularly over the surface, sometimes accidentally coinciding with the shallow foveæ, but generally not. This is a remarkable character, probably affecting also the allied *estriatus* described below, although in the specimens at hand there is no indication of it.

E. porcatus n. sp.—Body somewhat slender in the male, robust in the female, shining, the pronotum very feebly alutaceous, black throughout, moderately convex above, strongly so at the sides. *Head* moderate, somewhat densely punctate, very coarsely so on the epistoma; antennæ long and rather robust, the third joint about four times as long as wide and fully as long as the next two together, fourth nearly twice as long as wide. *Prothorax* about one-fourth wider than long, the apex just visibly narrower than the base, very feebly emarginate in circular arc, the angles slightly obtuse, very narrowly rounded; base feebly, evenly arcuate; sides more strongly arcuate before the middle, thence moderately convergent and gradually feebly sinuate to the basal angles, which are very obtuse but not distinctly rounded; disk evenly convex, finely, sparsely punctate, the punctures becoming rather coarse laterally but not very dense. *Elytra* about two and three-fourths times longer than the prothorax and, in the middle, very slightly wider in the male and nearly three-fourths wider in the female; base broadly, feebly emarginate, as wide as the contiguous base of the prothorax in the male but distinctly wider in the female, the apex very strongly declivous, not at all produced, narrowly rounded—viewed posteriorly—disk very deeply sulcate, the sulci finely, rather sparsely and muricately punctate, the intervals equal in width to the sulci, very convex, finely, sparsely punctate. Spurs of anterior tibiæ slender and pointed, unequal but more strongly so in the male. Length 18.0–19.0 mm.; width 6.0–8.8 mm.

Arizona (Fort Apache):

The three specimens before me indicate a species belonging near *obsoletus*, but not very closely allied to it. The size is very much larger, the elytra more deeply sulcate, the sulci finely punctate and

the intervals narrow and extremely convex; in *obsoletus* the sulci are always very coarsely punctate and the intervals wide and flatter. *Porcatus* further differs in its prolonged and prominent prosternal process, in its longer antennæ and in its very much longer and more robust tarsi.

E. cuneaticollis n. sp.—Rather slender in the male, robust in the female, moderately convex, rather shining, the pronotum feebly alutaceous; elytra coarsely rugulose. Head rather large, more than one-half as wide as the prothorax, very coarsely, deeply and rather densely punctured; antennæ short and robust, distinctly shorter than the head and prothorax, third joint two and one-half times as long as wide, fully as long as the next two, fourth but very slightly longer than the fifth. Prothorax from one-third to two-fifths wider than long, the apex nearly as wide as the base, broadly, very feebly emarginate in circular arc, the apical angles slightly obtuse, very narrowly rounded and not in the least prominent; base subtruncate, the angles slightly obtuse, not distinctly rounded but not noticeably prominent; sides strongly arcuate anteriorly, conspicuously convergent and almost perfectly straight in basal two-thirds; disk widest at apical third, broadly convex above, strongly convex and declivous at the sides, rather sparsely, coarsely and deeply punctate, the punctures about twice as large and distant as those of *humeralis*. Elytra distinctly less than twice as long as the prothorax and from one-fourth to two-fifths wider than the latter, at base equal in width to the contiguous base of the same, rather abruptly declivous and pointed at apex; humeri obtuse, not rounded, not in the least prominent; disk rather depressed above, gradually strongly convex and declivous toward the sides, very coarsely, deeply and densely punctate, the punctures irregularly arranged without trace of impressed striæ, not muricate but producing a strongly rugulose appearance by mutual semi-coalescence. Legs short and somewhat robust; spurs of anterior tibiæ rather slender but extremely unequal, the anterior more than twice as long as the posterior in the male, less unequal, the anterior about one-third longer than the posterior, although much more robust and obtusely pointed in the female. Length 14.0–15.0 mm.; width 5.2–6.9 mm.

California (exact locality unknown).

This species belongs near *humeralis* but differs in four important characters, viz: the much shorter and more robust antennæ and legs, the unexposed humeri, the very much coarser and deeper elytral sculpture and coarser, sparser pronotal punctures, and finally the smaller and much less unequal spurs of the anterior tibiæ in the male, the larger spur in *humeralis* being nearly four times as long as the smaller one. In considering this enormous disparity in size of the spurs, attention is redirected to the conditions existing in *Gnaptor*, alluded to in the introductory remarks to the present genus.

E. estriatus n. sp.—Moderately robust, strongly convex, smooth and highly polished, the pronotum very slightly alutaceous. *Head* rather transverse, moderate in size, rather coarsely punctate, the punctures sparse toward the middle, very dense and setose laterally; antennæ rather short and robust, the third joint very slightly longer than the next two together, fourth less than twice as long as wide. *Prothorax* just visibly wider than long, the apex truncate, equal in width to the base which is subtruncate; sides broadly arcuate anteriorly, convergent and nearly straight in basal half, the basal angles very obtuse and not at all prominent; disk moderately convex, very finely and sparsely punctate throughout. *Elytra* about three times as long as the prothorax, widest behind the middle and about two-fifths wider than the prothorax, at base equal in width to the base of the latter, the humeri not rounded but also not prominent; apex acute but not greatly prolonged; disk moderately declivous behind, finely but distinctly and very sparsely punctate, the punctures not asperate, not denser laterally and arranged without trace of order throughout. Length 17.8–26.0 mm.; width 6.5–9.7 mm.

California (San Francisco).

The two specimens before me differ very greatly in size but are exactly of the same form, the legs, however, in the small specimen, are relatively longer and more slender than in the larger one, in which they are unusually short and robust when compared with *longicollis* or *giganteus*, to which this species is allied. It differs from the former in its broader more anteriorly dilated prothorax, much shorter and rather more robust antennæ and coarser punctuation, and from the latter in the smaller size, less attenuate form, wider epipleuræ, less convex pronotum, less arcuate sides of the prothorax, shorter elytra and many other characters. In *giganteus* the elytra are generally but slightly less than four times as long as the prothorax.

The anterior tibial spurs in *estriatus* are rather slender, similar and very slightly unequal in length; in the larger specimen they appear to be relatively a little longer. I am therefore uncertain as to whether the two specimens are both males or both females, or whether the smaller is a male the larger a female; I am inclined however to think that the latter may be the case as if my memory is correct they were taken at the same time.

Although *giganteus* is said by Horn (Rev. Ten., p. 812) to occur near San Francisco, I have never found it in that locality, but have it from San Diego which is also the locality assigned it by LeConte in a penciled note. *Longicollis* does not occur within the true Pacific coast fauna.

E. tarsalis n. sp.—Body inflated in the female, more slender in the male, nearly smooth, strongly shining. *Head* rather strongly transverse, coarsely and strongly punctured at least toward the edges; antennæ rather short and robust. *Prothorax* distinctly wider than long, the base and apex nearly equal, subtruncate; basal angles very obtuse, sometimes very slightly prominent when viewed vertically; sides rather strongly arcuate anteriorly, straighter and rather strongly convergent in basal half; disk moderately convex, sparsely, finely but very distinctly punctate. *Elytra* about two and three-fourths times as long as the prothorax, at base slightly but distinctly wider than the base of the latter, the humeri very narrowly rounded but quite prominent; disk strongly, deeply punctate, the punctures generally simple but becoming muricate, although not denser, toward the sides, rather sparse throughout and distributed without trace of order. Length 19.5–21.0 mm.; width 7.3–9.3 mm.

California (Mount Diablo).

The single pair which I took at the indicated locality, near San Francisco, displays considerable sexual divergence, the male being moderately robust, with the elytra about two-fifths wider than the prothorax and the posterior tarsi very nearly three-fourths as long as the tibiae. In the female the prothorax is more transverse and but slightly more than one-half as wide as the elytra, the posterior tarsi being much shorter.

The present species belongs near *quadricollis* but may be distinguished by the nature of the punctuation, which is not arranged in series on the elytra, and by the prominent humeri and broader base of the elytra, also by the very much longer and thicker posterior tarsi of the male. The anterior spur of the anterior tibiae is longer and much more robust in the female, but is feebly arcuate and acutely pointed.

E. tenuipes n. sp.—Moderately slender, convex, rather smooth and shining throughout. *Head* finely, sparsely punctate; antennæ long and slender; third joint about five times as long as wide and nearly as long as the next three together. *Prothorax* rather more than twice as wide as the head, about as long as wide; apex very nearly as wide as the base, broadly, feebly emarginate in circular arc, the apical angles very acute and in the form of small everted teeth; base broadly, very feebly arcuate; basal angles extremely obtuse; sides almost evenly and distinctly arcuate; disk widest just visibly before the middle, rather strongly, evenly convex throughout; sides minutely beaded; surface feebly alutaceous, minutely and very sparsely punctate. *Elytra* elongate-oval, exclusive of the caudal prolongation four-fifths longer than wide, a very little more than three times longer, and, in the middle, two-thirds wider than the prothorax; sides evenly arcuate; humeri not prominent, the two bases equal in width; disk with distant unimpressed rows of fine simple moderately approximate punctures, the intervals each with a single

line of still finer and extremely widely spaced punctures, which are generally simple, but which laterally toward apex become very coarse sparse asperities. Total length 30.5 mm.; width 10.0 mm.

Texas (El Paso). Mr. G. W. Dunn.

The single type is a male and represents a very distinct species, combining the characters of *gracilis* and *lucæ*. The legs are long and extremely slender, the anterior femur with a strong spiniform tooth. The prothorax is almost as in *gracilis*, but is longer, while in the male the elytra are prolonged by a caudal appendage which is nearly one-fourth as long as the elytra. From *lucæ* it differs in its small dentiform and everted apical angles of the prothorax, and more feeble apical emargination.

As a very singular character, it will be noted that it is the very inconspicuous punctures of the intervals which become, toward the sides of the apical portions, the large strong and very conspicuous asperities, the fine punctures of the regular series remaining almost unmodified, but becoming slightly asperate very near the apex and on the caudal prolongation.

E. subcylindricus n. sp.—Form cylindrically convex, rather slender, finely very strongly alutaceous and smooth throughout, black; elytra castaneous. Head moderate, sparsely and rather finely punctate; antennæ rather long and slender, about as long as the head and prothorax, third joint nearly four times as long as wide. Prothorax subcylindrical, about one-fifth wider than long, transversely moderately but very evenly convex throughout, longitudinally very feebly convex; apex very nearly as wide as the base, subtruncate between the acute, very strongly advanced but not at all everted apical angles; base broadly, very feebly arcuate, the angles obtuse, not in the least rounded, not at all prominent; sides evenly and feebly arcuate throughout; disk very sparsely and extremely minutely punctate throughout. Elytra more than three times as long as the prothorax and rather less than one-third wider; base very feebly emarginate, exactly equal in width to the contiguous base of the pronotum; apex narrowed rather gradually in apical third, acutely rounded at tip; sides feebly convergent and arcuate near the humeri, parallel and almost perfectly straight thence to posterior third; humeri very obtuse, not rounded, not at all prominent; disk with unimpressed distant rows of very small, nearly simple punctures, the intervals with single rows of extremely widely distant but almost similar punctures, the punctuation not denser toward the sides. Legs long and very slender; anterior femora with a small but acute tooth slightly beyond apical third, the remaining femora simple but with the groove of the lower edge fine, very deep and conspicuous, extending almost to the base, with the cariniform edges finely, unevenly serrate; tibiae strongly arcuate, spurs of the anterior short, nearly equal and slender. Length 21.0–23.0 mm.; width 7.5–7.8 mm.

Arizona (exact locality unknown). Mr. G. W. Dunn.

The two examples before me are almost perfectly similar in every respect, but the peculiar coloration may nevertheless be due to immaturity.

This species is totally distinct in general habitus from any other which is known to inhabit the United States, and is not described in the *Biologia Centrali-Americana*; although far removed from *gracilis*, it may be placed near it for the present.

E. prominens n. sp.—Form somewhat as in *dentipes*, convex, smooth and alutaceous throughout. *Head* moderate, finely, sparsely punctate, more densely so toward the sides of the epistoma; antennæ short and very robust, much shorter than the head and prothorax, third joint about twice as long as wide and equal in length to the next two. *Prothorax* about one-sixth wider than long; apex and base subequal, the former broadly arcuate, sinuate laterally, the apical angles being acute, very prominent anteriorly and distinctly everted; base broadly, evenly, very feebly arcuate; sides broadly arcuate anteriorly, rather strongly convergent in basal half and strongly sinuate near the basal angles, which are acute and prominent; disk rather strongly convex throughout, finely and sparsely punctate, strongly alutaceous, the side margins very minutely beaded. *Scutellum* strongly transverse, broadly rounded behind, highly polished and impunctate. *Elytra* at base broadly, feebly emarginate and about as wide as the contiguous base of the prothorax, gradually narrowed and acute at apex; sides evenly arcuate; humeri obtuse but not rounded, not prominent; disk widest at the middle, where it is rather more than one-third wider than the prothorax, feebly alutaceous, finely, sparsely punctate, the punctures nearly simple, arranged in widely distant, rather feebly defined, unimpressed rows, the intervals with a few widely distant and nearly similar punctures. *Legs* rather short and slender, the anterior femora with a short obtuse tooth near outer third; middle and hind femora simple; spurs of anterior tibiæ moderate in length, slender, similar and very nearly equal. Length 19.0 mm.; width 7.8 mm.

California (San Luis Obispo Co.).

I obtained a single specimen of this very distinct form at Port Harford. It belongs near *dentipes* but is more robust, the elytra being shorter, the prothorax is, however, much narrower, the sides being convergent and nearly straight from the middle. One of the chief differences lies in the antennal structure, the third joint being very much shorter; in *dentipes* the antennæ are very nearly as long as the entire head and prothorax and are much more slender.

E. elegans n. sp.—Moderately robust, strongly convex, strongly alutaceous, the elytra moderately shining; integuments nearly smooth. *Head* moderate, somewhat finely, sparsely punctate; antennæ rather short but slender,

not quite as long as the head and prothorax, third joint about two and one-half times as long as wide, scarcely as long as the next two, fourth much longer than the fifth. *Prothorax* nearly one-third wider than long, the apex a very little narrower than the base, transversely truncate, the apical angles small but acute, anteriorly prominent, dentiform and feebly everted; base very feebly, evenly arcuate; sides strongly, almost evenly arcuate throughout, the basal angles very obtuse, not rounded but not in the least prominent; disk rather strongly convex throughout, widest just before the middle, somewhat sparsely but deeply and rather coarsely punctate; side margins very minutely beaded. *Elytra* about three times as long as the prothorax, and at base, just visibly wider than the base of the latter, gradually acute at apex, inflated, widest in the middle where they are about three-fourths wider than the prothorax; sides evenly arcuate; humeri obtuse but not rounded, not at all prominent; disk confusedly, finely creased, rather coarsely and distinctly granulato-reticulate, very finely and sparsely punctate, the punctures nearly simple throughout and not denser laterally, arranged in very feebly defined unimpressed rows, approximate toward the suture, then widely distant, with an uneven and sparser row along the middle of the intervals. *Legs* moderate in length and very slender; anterior femora not dentate but with a very broad and obtuse rounded salient near the apex; spurs of the anterior tibiae very slender and almost exactly equal. Length 13.0 mm.; width 6.0 mm.

California (Hoopa Valley, Humboldt Co.).

The unique type of this species is one of the most symmetrically proportioned insects of the family. There is no described species with which it can be compared, but for the present it may be placed near *dentipes*.

E. brunnipes n. sp.—Rather robust, moderately convex, coarsely, densely sculptured and dull, black; legs dark brown throughout. *Head* large, fully two-thirds as wide as the prothorax, coarsely, extremely densely punctate and scabrous; antennæ longer than the head and prothorax, rather slender, third joint about four times as long as wide. *Prothorax* scarcely one-third wider than long; base and apex very nearly equal in width, subtruncate; apical angles obtuse, not distinctly rounded, not at all prominent; basal right, not rounded; sides strongly angulate at the middle, thence very feebly arcuate to the apex and broadly sinuate to the base; disk moderately, evenly convex throughout, very coarsely, deeply and confluent punctate. *Elytra* at base nearly one-third wider than the contiguous base of the prothorax, very slightly more than twice as long as the latter, abruptly and obtusely rounded behind when viewed vertically; sides strongly arcuate behind, gradually convergent and straighter thence to the humeri, which are slightly obtuse but scarcely at all rounded; disk widest behind the middle, where it is from one-third to two-fifths wider than the prothorax, feebly convex above, strongly so laterally, coarsely, densely, asperately punctate, the asperities arranged without trace or order. *Legs* moderate in length, somewhat slender. Length 9.2–9.5 mm.; width 4.3–4.6 mm.

Idaho; Wyoming.

One of the smallest species of the genus and quite isolated; it is somewhat allied to *pimelioides* although very much smaller. In *pimelioides* the sides of the prothorax are arcuate, and only sinuate for a short distance before the basal angles, and the sculpture of the elytra consists of rounded flattened tubercles which are generally arranged in very distinctly traceable approximate rows; the legs are black and the head very much smaller when compared with the prothorax, which is much more transverse; the humeri are broadly rounded. The species described by LeConte as *viator* does not differ from *pimelioides*, the type being perfectly identical with the ordinary males of that species.

EMBAPHION Say.

E. laminatum n. sp.—Moderately robust, the male more slender, black and dull throughout. *Head* small, very finely, sparsely and subasperately punctate; antennæ slender, third joint from four to nearly five times as long as wide, eighth one-half longer than wide. *Prothorax* about one-half wider than long, the median portion very feebly convex, fully as long as wide, and having two feeble, subparallel and sinuous impressions near the middle of the disk; side margins very widely and strongly reflexed, the outer edges parallel, strongly and evenly arcuate throughout, the basal angles broadly rounded and projecting beyond the transverse median portion of the base; apex strongly emarginate, the emargination not quite three times as wide as deep; surface throughout finely, extremely sparsely and subasperately punctate. *Elytra* from one-half to four-fifths longer than wide, at base transversely truncate, the sides very thin and broadly but not abruptly reflexed, the acute lateral edges parallel and feebly arcuate in basal two-thirds, then rounded to the apex and slightly prolonged, uniting in a prolongation of the suture; humeri rounded; disk distinctly wider than the prothorax, each elytron broadly concave, the suture elevated; surface with approximate, imperfectly defined and feebly impressed rows of rather coarse, impressed punctures, also finely and sparsely asperate. Inflexed sides of the elytra nearly flat, somewhat coarsely and sparsely but unevenly punctate, the epipleuræ very imperfectly defined except near the apex. *Legs* very slender. Length 14.0–15.0 mm.; width 6.8–7.5 mm.

Texas (El Paso). Mr. G. W. Dunn.

The elytral punctures referred to in the description are merely impressed foveæ, and do not appear to be in the least setigerous; the finer but strong and sparse asperities are distributed over the surface without regard to the punctures, and each bears a strong thick semi-erect seta—see third remark under *Eleodes*.

This species is related only to *contusum* Lec., but differs greatly in the upper surface of the elytra. In *contusum* the elytra are nearly flat, sometimes feebly and transversely convex, the side margins being very narrowly but abruptly reflexed, while in *laminatum* the upper surface is broadly, strongly concave throughout, the concavity of the general surface extending unbroken to the extreme edges; the elytral suture is however distinctly elevated, so that it might be more proper to say that each elytron is concave; the humeral portion of the side margins is as usual a little more strongly reflexed. The prothorax and the conformation of the posterior angles are almost exactly as in *contusum*, except that the sides are more widely reflexed. In *contusum* the pronotum is fully twice as densely asperate.

EULABIS Esch.

The species of this genus are not closely allied among themselves and may be easily identified from the original descriptions; the following species is, however, somewhat similar in appearance to *rufipes* although twice as large.

E. crassicornis n. sp.—Oblong-elongate, not pubescent, moderately convex, dull, very dark rufo-piceous throughout, the legs just visibly paler. *Head* moderate, about one-half as wide as the prothorax; upper surface flat, rather finely, extremely densely, confluent punctate throughout and dull; sides not perceptibly reflexed, the eyes rather depressed; antennæ not quite as long as the head and prothorax, very robust, strongly compressed and incrassate toward apex, second joint much shorter and narrower than the fifth. *Prothorax* about one-third wider than long; apex but very slightly narrower than the base, subtruncate, the apical angles narrowly rounded and slightly prominent anteriorly; base truncate, very broadly, feebly sinuate toward the basal angles which are not at all rounded and generally minutely prominent, the sides being sinuate for a short distance before them; sides strongly, evenly arcuate; disk feebly convex, rather depressed toward the very finely reflexed side margins, somewhat coarsely, very deeply and densely punctate, the punctures longitudinally coalescent. Scutellum not entering the elytral disk. *Elytra* scarcely more than twice as long as the prothorax and but just visibly wider than the latter, otherwise very nearly as in *rufipes*. *Abdomen* densely very coarsely and deeply punctate, the setæ rather long and distinct. Length 7.0-7.8 mm.; width 3.1-3.3 mm.

California (southern).

The mentum is wider than long, trilobed at apex, the lateral lobes acute and anteriorly prominent; the surface is deeply biim-

pressed, the two foveæ separated by a strong thick and tumid carina which becomes much less prominent toward base; this is also very nearly the form in *rufipes*.

This species differs from *rufipes* in antennal structure and in its larger size, more robust and depressed form, more transverse prothorax, much longer and more conspicuous abdominal setæ and in the structure of the penis; the latter in *rufipes* is very slender, perfectly flat throughout and gradually acuminate, while in *crassicornis* it is more robust and has a transverse tumid elevation on the upper side at the apex. The second antennal joint in *rufipes* is as long as the fifth and very nearly as wide in both sexes.

ARGOPORIS Horn.

The species found within the limits of the United States may be separated as follows:—

Elytra sulcate; posterior femora of the male with a large acute tooth, the edges of which are finely denticulate.....**costipennis**
Elytra not sulcate, having very feebly impressed rows of deep perforate punctures.

Upper surface finely, strongly alutaceous; posterior femora of the male with a large bifid tooth, the edges of which are finely denticulate.

alutacea

Upper surface polished.

Head sparsely punctate, the epistoma strongly, transversely convex or tumid; hind femora of the male with two small, acute and exactly equal teeth which are widely separated, the intervening edge straight.

bicolor

Head densely punctate; epistoma flat; hind femora of the male with three equidistant teeth, the one nearest the base long, slender, very abrupt, the other two equal and very small**nitida**

The species here described under the name *alutacea*, has been confounded by Horn (Rev. Ten., p. 325) and Champion (Biol. Cent.-Amer., Col., IV, i, p. 94) with *bicolor* Lec. On the plate figures are given of the posterior femur of all the species included in the table, and that of *bicolor* has been drawn directly from the original type in the cabinet of LeConte; this type corresponds exactly with a large series in my own cabinet, collected near the Mojave Desert, and I have never seen a specimen of *bicolor* which was taken beyond the confines of California.

A. alutacea n. sp.—Body black throughout, smooth, dull, parallel, moderately convex; elytra rather depressed toward the suture; legs dark rufous; antennæ piceous. *Head* nearly as long as wide, flattened above, the sides before the eyes convergent and broadly reflexed; surface finely, rather sparsely punctate, the punctures coarser toward the eyes; epistoma very feebly, longitudinally convex; antennæ slightly longer than the prothorax, moderately robust but strongly incrassate toward tip. *Prothorax* always fully as long as, and sometimes slightly longer than wide; apex and base subequal, the former truncate, the latter broadly, feebly emarginate, the basal angles acute and prominent posteriorly; sides distinctly convergent behind in basal two-thirds and feebly arcuate; disk extremely minutely but rather densely punctate. *Elytra* about twice as long as the prothorax and, near the middle, just perceptibly wider; humeri finely but acutely dentate, the basal margin being strongly tumid throughout, sides feebly arcuate, disk with almost completely unimpressed rows of coarse perforate punctures, the latter generally separated by fully twice their own diameters; intervals flat, the first and third slightly elevated near the apex, extremely minutely and rather sparsely punctate. *Legs* very robust. Length 12.5–15.0 mm.; width 4.0–5.0 mm.

Arizona. Mr. Morrison.

The first ventral segment is strongly and transversely tuberculate in the middle in the male. This species is larger, blacker, duller and more densely punctate than *bicolor*.

A. nitida n. sp.—Subparallel, moderately convex, polished, dark rufocastaneous, the legs and antennæ nearly concolorous. *Head* finely, very densely punctate throughout, the sides broadly reflexed; epistoma extremely feebly, transversely convex; antennæ short, scarcely longer than the prothorax, moderately robust, incrassate toward apex. *Prothorax* as wide as long; apex truncate; base feebly emarginate, the basal angles slightly prominent posteriorly; sides broadly arcuate, more convergent and gradually very feebly sinuate toward the basal angles; disk very minutely, rather sparsely punctate, the punctures a little larger and denser toward the sides. *Elytra* elongate-oval, gradually narrowed behind and rather strongly rounded at apex, distinctly more than twice as long as the prothorax and scarcely perceptibly wider; sides very distinctly arcuate; humeri finely denticulate; disk with feebly impressed rows of very coarse, deep, perforate punctures; intervals flat, the first and third strongly elevated near the apex, extremely minutely, rather sparsely punctate throughout. *Legs* rather slender. Middle of the first ventral segment tuberculate in the male. Length 11.5 mm.; width 3.7 mm.

Texas (probably near El Paso). Mr. G. W. Dänn.

The single specimen represents a species resembling *bicolor* somewhat in general habitus, but differing in its longer and much more densely punctate head, more convex elytral intervals near the apex and several other characters.

CRATIDUS Lec.

The three species of this genus may be distinguished as follows:—

Posterior angles of the prothorax acute and prominent.

Pubescence pale tawny yellow**osculans**

Pubescence piceous-black**fuscipilosus**

Posterior angles rounded**rotundicollis**

C. fuscipilosus n. sp.—Form robust, convex, shining, very densely clothed throughout with fine, long, erect, brown-black hairs. *Head* moderate, densely and rather coarsely punctate; antennæ rather long and robust, but very feebly incrassate toward apex, third joint fully three times as long as wide. *Prothorax* from two-fifths to one-half wider than long, convex, strongly rounded at the sides, which are very strongly convergent near the base and sinuate for a very short distance before the basal angles the latter being very small but acute and prominent; apical angles prominent acute dentiform and everted; surface coarsely, very deeply and densely punctate. *Elytra* about two and one-half times as long as the prothorax, oval, obtusely rounded at apex from above, convex, somewhat finely but densely and very deeply punctate, with imperfectly defined, unimpressed rows of similar but coarser punctures. *Legs* short and robust, clothed with similar long, dark pubescence. Length 14.0–16.0 mm.; width 7.2–8.3 mm.

Southern California.

The pubescence is nearly similar in color to that of *Amphidora nigropilosa*, but while in *C. fuscipilosus* the hairs are all alike, the pubescence is dual in composition in the species referred to, there being a system of long blackish hairs which are erect, and another system of shorter, more appressed and paler ones.

This species belongs near *osculans*, but differs not only in the color of the pubescence, which is quite constant throughout the series of four specimens before me, but in its greater density, also in the much more robust and compact form of the body, the prothorax being shorter, more transverse and more nearly equal in width to the elytra.

The hind tibiae of the male have a strongly developed acute oblique tooth near apical third as in *osculans*.

IPHTHIMUS Traqui.

Our western forms, allied to *serratus*, may be distinguished as follows:—

Punctures of the elytral intervals coarse and deep.

Pronotum coarsely, very densely punctate throughout, the punctures generally subconfluent toward the sides, general surface lustre opaque.

serratus

Pronotum finely, sparsely punctate toward the middle, more coarsely and densely so laterally; surface somewhat shining; prothorax larger and longer; form of body more elongate **sublævis**
 Punctures of the pronotum and elytral intervals exceedingly minute, sparse.
 Elytra normal, coarsely, deeply striate, the striæ with very coarse, impressed and uneven punctures; intervals convex **lewisi**
 Elytra abruptly declivous near the base, without impressed striæ, but with series of very fine, widely but unevenly spaced punctures, the intervals flat..... **lævissimus**

These four forms are specifically distinct, there being no known intergrades; *lewisi* in fact differs more radically from *sublævis* than the latter does from the European *croaticus*.

I. lævissimus n. sp.—Robust, subparallel, rather strongly convex, smooth and finely alutaceous, the pronotum rather more shining than the elytra. *Head* rather longer than wide, somewhat coarsely but sparsely punctate; antennæ very robust. *Prothorax* about one-half wider than long, the apex truncate and very distinctly narrower than the base, the latter transverse and broadly, feebly bisinuate; basal angles acute and prominent; sides parallel and strongly arcuate in apical two-thirds, then strongly convergent and sinuate to the base, very coarsely and unevenly crenulate; disk rather strongly convex, declivous toward the sides which are very narrowly reflexed, very sparsely and minutely punctate, more coarsely but scarcely more densely so very near the sides. *Elytra* just visibly wider behind, two-thirds longer than wide, gradually narrowed and pointed through apical third, about three and one-half times longer and nearly one-third wider than the prothorax; humeri rounded; disk abruptly declivous from a short distance behind the base to the basal margin, very smooth but alutaceous, the striæ feebly indicated by very fine and nearly obsolete longitudinal creases. Length 23.5 mm.; width 9.3 mm.

California (Sierras). Mr. W. G. W. Harford.

This is one of the largest species known to me, and is very distinct from *lewisi* in its much more robust form, more transverse prothorax, declivous base of the elytra and unimpressed striæ.

The two species *lævissimus* and *lewisi* are further distinguished from *serratus* and *sublævis* by the somewhat longer head, less widely flattened and explanate sides of the pronotum and truncate apex, the apex of the prothorax being relatively wider and broadly, feebly sinuate in the latter of the two groups.

BLAPSTINI.

The characters originally employed by LeConte and subsequently followed by Horn in the classification of our genera of Blapstini, do not seem to be sufficiently concise or decisive to distinguish the

genera in a satisfactory manner. The form of the intercoxal projection of the abdomen, for example, varies so little throughout the group that mistakes are absolutely unavoidable in attempting an identification from the form of this process. The characters borrowed from the general form of the antennæ are also unsatisfactory.

The group is essentially American, there being to my knowledge but a single palæarctic genus which can be included; this genus—*Cabirus* Muls.,—comprises a very few small species, apparently confined to Asiatic Turkey and the neighboring regions.

The following study has been carefully made with the hope that these obscure and neglected little insects may be thereby somewhat better understood. They are in no wise difficult to identify, except in certain parts of the very large genus *Blapstinus*, the species being unusually clearly defined and constant for the Tenebrionidæ, where the great specific variation in outward form is so familiar to us in *Eleodes*.

The genera are very readily separable into two distinct sections as follows:—

I.—Body always winged, the wings sometimes very rudimentary; scutellum normal, triangular, distinctly separating the elytra at base, and having a wide polished impunctate and generally semi-coriaceous border; anterior tarsi of the male usually dilated.

Anterior tibiæ bent, more strongly so in the male; pubescence dual in structure.....**Trichoton**

Anterior tibiæ straight; pubescence simple.

Base of the prothorax bisinuate and as wide as the base of the elytra.

Anterior tibiæ externally produced at apex in a dentiform process; prothorax and elytra fimbriate at the sides.....**Ulus**

Anterior tibiæ not externally produced at apex; sides not fimbriate.

Blapstinus

Base of the prothorax straight, narrower than the base of the elytra.

Mecysmus

II.—Body completely apterous; scutellum very short and broad, usually not entering the disk of the elytra; anterior tarsi never dilated in the male.

• Maxillary palpi normal, the fourth joint strongly securiform.

Prothorax not fimbriate at the sides.....**Conibius**

Prothorax fimbriate at the sides with robust posteriorly recumbent and contiguous setæ, forming a narrow dense border.

Anterior tibiæ narrow, normal.....**Conibiosoma**

Anterior tibiæ broadly triangular and compressed.....**Notibius**

Maxillary palpi with the fourth joint very broadly oval, broadly truncate and having an unusual development of spongy white membrane in the apical cavity; base of the pronotum straight; scutellum nearly as in *Blapstinus*.....**Cybotus**

TRICHOTON Hope.

On reading the description given by Champion of the species *T. lapidicola* and *T. curvipes*, there is very little reason for doubting that our *Blapstinus sordidus* should also be referred to the same genus. In *T. sordidum* the eyes are completely divided; the genus therefore belongs to the Blapstini and in no wise to the Opatrini, where it was placed by Lacordaire.

Trichoton is very closely allied to Blapstinus, resembling it in nearly all details of structure, but departs widely therefrom in the form of the anterior tibiæ and in the nature of the vestiture. The latter is of dual structure, consisting of finer, but still rather short coarse and recumbent hairs, and longer erect and very robust bristles, irregularly scattered in clusters on the elytra; these bristles are very peculiar, as will appear below. The eleventh joint of the antennæ also differs in form.

T. sordidum Lec.—*Blapstinus sord.*: Ann. Lyc. N. Y., V, p. 146.—Oblong-oval, moderately convex; integuments somewhat shining, piceous, but almost completely concealed by the very dense ochreous-yellow vestiture, which on the elytra is finely and confusedly mottled with patches of dark brown bristles; legs and antennæ rufo-piceous. Head strongly transverse, strongly rounded throughout anteriorly, the epistoma deeply sinuate in the middle, somewhat finely but very deeply and densely punctate; upper lobe of eyes rather large, rounded; antennæ robust, a little shorter than the head and prothorax, somewhat feebly incrassate toward apex, third joint more than twice as long as wide but distinctly shorter than the next two together, eleventh fully as wide as the tenth, rather longer than wide, ovate, obliquely pointed at apex. Prothorax fully twice as wide as the head and about twice as wide as long; apex very much narrower than the base, very deeply emarginate, the angles right, not at all rounded and anteriorly prominent; base transverse, the lateral sinuations wide and very deep; basal angles nearly similar to the apical, very slightly acute; sides strongly and evenly arcuate throughout; disk widest a little before the base, very broadly and abruptly explanate at the sides throughout the length, rather finely but very deeply and densely punctate throughout, the coarse bristles and coarse recumbent hairs almost evenly intermingled, the latter condensed in two small discal spots. Scutellum triangular, distinct, densely pubescent, the smooth border very narrow. Elytra behind the middle very slightly wider than the prothorax, nearly three times as long; sides almost straight toward base, arcuate behind; apex rather narrowly rounded; disk with rather fine, moderately impressed striæ which are closely and not very coarsely punctate; intervals wide, alternately more strongly although moderately convex beginning with the third interval, very obscurely but rather densely punctate, each puncture

filled by the hair. *Abdomen* densely pubescent, with a denser patch at the side of each segment.

Male.—Anterior tibiae strongly, inwardly bent near apical third, the inner outline being obtusely and angularly emarginate, the outer strongly, evenly arcuate toward apex; intermediate tibiae with a small internal notch near the apex; anterior tarsi just visibly wider; abdomen broadly, very feebly impressed in the middle toward base.

Length 6.6–7.7 mm.; width 3.5–4.2 mm.

Arizona.

The anterior and middle tarsi in both male and female are densely clothed beneath with long fine hair, which however is a little coarser in the female; in both sexes the hind tarsi are coarsely spinose beneath. In the female the anterior tibiae are feebly bent in apical third, the inner line being broadly sinuate; the entire tibia, however, is rather more robust than in the male.

The coarse bristles of the dorsal surface, to which allusion has been made, are of extraordinary form, being triangular in transverse section; they are equal in thickness throughout the length, and the apex is transversely truncate.

The punctures of the elytral striae are very obscure unless the specimen be rubbed, as in nature the integuments are covered with a dull exudation.

This species is not at all rare but appears to be rather local, being confined to the Gila Valley and the higher regions to the eastward in southern Arizona.

ULUS Horn.

In this genus the form is more robust and elliptical than in *Trichoton*, and the presence of well-marked fimbriae at the sides of the pronotum and elytra, together with the very dense, coarse and conspicuous pubescence, gives the species a peculiar habitus. The fimbriae are but rudimentarily developed in *Trichoton* and completely wanting in *Blapstinus*.

The sexual characters are very feeble, the anterior tarsi being the only part which is noticeably modified in the male, and even here the dilatation is so excessively slight as to almost elude detection. The males are much less abundant than the females and are generally a very little less robust.

The species burrow in loose sand or mud, the enlarged apex of the anterior tibiae being well suited for this purpose. They are

probably more abundant than hitherto supposed, their secluded habits and, in many cases at least, rather restricted habitat, rendering it probable that several additional ones will be discovered by future collectors. The five species before me may be thus distinguished:—

Elytral intervals equal in convexity throughout.

Lateral fimbriæ of the prothorax rather long and very dense, conspicuous; eyes smaller, the upper lobes separated by from six to seven times their own width.

Elytral striæ rather strongly impressed, the intervals distinctly convex.

obliquus

Elytral striæ scarcely at all impressed, the intervals flat... **fimbriatus**

Lateral fimbriæ very inconspicuous, composed of very short and not very close-set setæ; eyes larger, separated by from four to five times their own width.

Strongly convex, moderately elongate and more broadly, evenly elliptical.

maritimus

Moderately convex, elongate and oblong-oval; size larger.

elongatulus

Alternate intervals of the elytra wider, more convex and more densely pubescent; intervals throughout much more densely rugulose and punctate; form more oblong and parallel..... **crassus**

U. obliquus Lec.—*Blapstinus obliq.*: New Species Col., 1866, p. 117.—Elliptical, strongly convex, piceous throughout; legs and antennæ concolorous; integuments shining, the pubescence rather short and coarse, moderately dense, evenly distributed, pale flavate and conspicuous. Head moderately transverse, very densely, deeply punctate; sides very feebly convergent anteriorly from the narrowly rounded basal angles; epistoma strongly sinuate; upper lobe of eyes moderate, longer than wide; antennæ in length subequal to the prothorax, rather slender, last three joints very slightly wider, third more than twice as long as wide, much shorter than the next two, eleventh wider than long, narrowly truncate at apex, fully as wide as the tenth. Prothorax twice as wide as the head and very nearly twice as wide as long; apex scarcely three-fourths as wide as the base, rather strongly emarginate in circular arc, the angles not notably rounded; base transverse, broadly, feebly sinuate in lateral third; basal angles right, not rounded; sides evenly and very feebly arcuate throughout; disk widest at base, rather finely, deeply and densely punctate throughout, the punctures generally separated by from once to twice their own diameters. Scutellum polished. Elytra in the middle distinctly wider than the prothorax, about three times as long; sides evenly arcuate, continuous with those of the prothorax; disk rather coarsely striate, the striæ distinctly and rather strongly impressed, approximately and somewhat coarsely punctured; intervals feebly evenly and equally convex throughout the width, equally punctate and pubescent, the punctures rather coarse

and sparse, the interspaces shining. *Abdomen* rather coarsely and sparsely punctate, the pubescence fine, rather long, pale and distinct. *Legs* long.

Male.—Unknown.

Length 7.7 mm.; width 4.1 mm.

Lower California (Cape San Lucas). Cab. LeConte.

The type is unique and is probably a female. It is the largest species of the genus which I have been able to study.

***U. fimbriatus* n. sp.**—Elliptical, strongly convex and shining, piceous throughout; pubescence short and very robust, moderately dense, pale luteous and conspicuous. *Head* strongly transverse, feebly convex, somewhat coarsely and not very densely punctate; epistoma very deeply sinuate; upper lobe of eyes moderate; antennæ slender, nearly as in *obliquus* but much longer than the prothorax. *Prothorax* more than twice as wide as long; apex three-fourths as wide as the base, rather strongly emarginate in circular arc; base broadly, feebly arcuate in the middle, very slightly sinuate laterally, the basal angles not projecting as far behind as the median lobe; sides evenly and distinctly arcuate; disk rather coarsely and deeply, somewhat unevenly and sparsely punctate, the punctures denser toward the sides, but not contiguous. Scutellum broadly triangular, polished, almost completely impunctate and glabrous. *Elytra* in the middle slightly wider than the prothorax, rather more than three times as long; sides evenly arcuate; disk with unimpressed rows of rather small but deep, perforate and very distinct punctures which are circular and closely placed; intervals wide, flat, equally punctate and pubescent throughout the width, the punctures very fine and sparse, the interspaces strongly shining, not distinctly rugulose. *Abdomen* somewhat coarsely and sparsely punctate, the pubescence moderate in length, coarse, pale and distinct. *Legs* long.

Male.—Anterior tarsi extremely feebly but noticeably dilated, and having beneath a narrow line of coarse flavate squamules; intermediate robust, the second and third joints each with an extremely narrow tuft of squamules beneath; abdomen with a very small area near the base which is just visibly flattened.

Length 5.7–6.5 mm.; width 2.9–3.4 mm.

Texas (El Paso).

I took a single representative of this species at the indicated locality, and subsequently received a large series collected there by Mr. Dunn. *Fimbriatus* is somewhat allied to *obliquus* but differs in its smaller size, shorter and more transverse head and prothorax with less oblique sides of the latter, rather larger eyes, shorter and coarser vestiture, unimpressed and more finely punctured clytral striæ and flat intervals. The surface also seems to be more highly polished. The elytral striæ become feebly impressed toward the sides, but the intervals remain flat.

U. maritimus n. sp.—Elliptical, rather strongly convex, piceous throughout, polished; pubescence short, very coarse, recumbent, rather sparse but pale flavate and conspicuous. *Head* much wider than long, feebly convex, rather finely and sparsely punctate; epistoma strongly sinuate; upper lobes of eye large, separated by scarcely four times their own width, circular; antennæ slender but strongly compressed and dilated toward apex, distinctly shorter than the head and prothorax, third joint slender, nearly twice as long as wide and but slightly longer than the fourth, eleventh fully as wide as the tenth and much longer, slightly wider than long, the apex obtusely and rather obliquely rounded. *Prothorax* twice as wide as long; apex about four-fifths as wide as the base, broadly, deeply emarginate; base broadly, rather strongly arcuate in the middle, the lobe extending posteriorly distinctly beyond the basal angles, broadly sinuate laterally; basal angles slightly acute, not at all rounded; sides evenly, strongly arcuate throughout, very feebly convergent anteriorly in basal half; disk somewhat coarsely and sparsely punctate. Scutellum polished, with a few minute widely scattered punctures toward base. *Elytra* in the middle slightly wider than the prothorax, more than three times as long; sides evenly arcuate; apex acute; disk with extremely feebly impressed series of coarse deep perforate punctures, which are generally separated by nearly twice their own diameters; intervals flat, smooth, polished, minutely and sparsely punctate, equally pubescent throughout. *Abdomen* sparsely punctate, the punctures deep, gradually very coarse and denser toward base; pubescence short, sparse, pale and very stout.

Male.—Anterior tarsi robust but not distinctly dilated, with very small narrow tufts of fine yellow pubescence beneath, the basal joint very obsoletely tufted; intermediate tarsi and abdomen not modified.

Length 4.9–5.7 mm.; width 2.5–2.9 mm.

Texas; Florida.

This species is similar in form to *fimbriatus*, but differs in its smaller size, coarser and more distant stria punctures, larger eyes, shorter pronotal fimbriæ and many other characters; it is peculiar to the sand dunes which line the ocean beaches, and I have taken it in considerable abundance at Galveston. The sexual modifications of the male are extremely feeble.

U. elongatulus n. sp.—Elongate-elliptical, very moderately convex, piceous-black throughout, rather shining; pubescence short, robust, moderately dense, pale ochreous-flavate and conspicuous. *Head* strongly transverse, rather coarsely deeply and densely punctate, the punctures distinctly separated; epistoma deeply sinuate; upper lobes of eye moderately large, separated by fully five times their width; antennæ slender toward base, strongly dilated toward apex, third joint slender, more than twice as long as wide, joints three to five uniformly and somewhat rapidly decreasing in length, eleventh fully as wide as the tenth, nearly as long as wide, narrowly and squarely truncate at apex. *Prothorax* a little more than twice as wide as long; apex rather

deeply emarginate, three-fourths as wide as the base, the latter broadly lobed in the middle, feebly sinuate laterally, the basal angles not as prominent as the median lobe; sides rather strongly, evenly arcuate; disk rather coarsely and densely punctate throughout. Scutellum highly polished. *Elytra* but very slightly wider than the prothorax and much more than three times as long; sides very feebly arcuate; apex acutely rounded; disk with coarse shallowly excavated grooves, which are coarsely deeply and perforately punctured, the punctures generally separated by less than their own diameters; intervals equal, very feebly convex, rather finely, not very sparsely punctate. *Abdomen* sparsely but rather coarsely punctate, especially toward base, the pubescence rather fine, short and sparse.

Male.—Anterior tarsi robust but scarcely at all dilated, the first joint not tufted beneath, second with a single small tuft of fine yellowish pubescence, third with two similar tufts arranged transversely; intermediate tarsi not modified.

Length 5.6–6.3 mm.; width 2.7–3.1 mm.

Texas.

A considerable series of this distinct species is before me, collected at various points in Texas, and among them are several examples taken at Columbus by Mr. Schwarz. Most of the specimens are covered more or less thoroughly with a dense indurated mass of argillaceous material, which from its appearance is undoubtedly the all-pervading adobe mud, so characteristic of the southwest. Its habits are therefore somewhat different from those of the majority of species, which seem to prefer clean loose sand.

Elongatulus cannot readily be confounded with any other species here described.

U. crassus Lec.—*Blapstinus cras.*: Ann. Lyc. N. Y., V, p. 146.—Oblong-oval, moderately convex, dark brown to piceous, feebly shining; pubescence short, robust and dense, conspicuous. *Head* moderately transverse, densely punctate; epistoma broadly, deeply sinuate; upper lobe of eyes rather small; antennæ slender toward base, very moderately robust toward the apex, third joint slender but shorter than the next two, tenth scarcely more than one-third wider than long, eleventh fully as wide as the tenth, as long as wide, narrowly truncate. *Prothorax* a little more than twice as wide as long; apex broadly, moderately emarginate in circular arc; base broadly, feebly lobed and more produced in the middle than at the basal angles, broadly, very feebly sinuate laterally; sides rather strongly arcuate anteriorly, nearly parallel in basal two-thirds; disk rather finely and very densely punctate throughout, the punctures generally distinctly crowded and in mutual contact. Scutellum polished. *Elytra* just visibly wider than the prothorax and not more than three times as long; apex rather acute; disk with moderate, rather distinctly impressed striæ, which are not very coarsely but very closely punctate; intervals alternately narrower and flat, and wider and feebly but distinctly

convex, finely, densely rugulose and punctate throughout, the punctures and pubescence denser on the more convex intervals. *Abdomen* somewhat densely punctate, the punctures not greatly coarser toward base, the pubescence unusually long, dense and conspicuous.

Male.—Sexual characters nearly as in *elongatulus*.

Length 6.0–6.5 mm.; width 2.8–3.3 mm.

California; Arizona.

It is stated by Horn (Rev. Ten., p. 358) that this species occurs near San Francisco; LeConte gives San Diego as the locality in his original description. I have never seen it from the former locality, but have specimens from Arizona. I think, therefore, that the species probably belongs exclusively to the San Diego fauna.

The species is quite distinct from any other here described in its more oblong form, more parallel sides of the prothorax, and more densely punctate, pubescent and rugulose elytral intervals, which are alternately wider and more convex.

BLAPSTINUS Latr.

This is a rather large and somewhat composite genus, the chief characters, subject to variations which in their several stages may be regarded as of specific value, being the following, omitting for the present any discussion of the minor characters, such as general sculpture, punctuation, outline, magnitude of the eyes or structure of the antennæ, which can be well understood by inspecting the table of species given below.

1—In regard to the hind wings it should be stated that the usual idea, probably originating with Lacordaire, that some of the species are apterous, is erroneous, all of our species being winged. The wings are, however, extremely varied in development, sometimes consisting of a mere slender cellular or membranous plate, less than one-half as long as the prothorax, and in other cases being fully as long as the elytra, with every intermediate form. In no case do they seem to be large enough, however, to give more than a labored and feeble flight.

In the investigation of a genus such as *Blapstinus*, which becomes in some parts very monotonous in the uniformity of specific type, it is fortunate that we have so diversified an auxiliary character as that afforded by the wings, and, as the individuals are generally numerous, one at least can be spared for dissection in many doubtful cases. In employing this character, however, it is undoubtedly

necessary to allow a more or less extended latitude for variation in the size of the wing, especially in the more rudimentary forms, where complete inutility probably prevents the operation of any of the laws of natural selection, which act so powerfully to maintain or perfect the standard in those organs which, by reason of constant utility, are continually brought under their influence. The present, however, is perhaps not the best occasion to discuss the propriety of using differential characters relating to rudimentary organs; it is a subject requiring far wider study than I have been able to give it, and it can only be said that any truth which the preceding hypothesis may involve, has been guarded against by giving more weight to the general shape of the wing than to size, unless the latter should exhibit very decided divergence.

2—The vestiture varies conspicuously, but is always uniform in structure. It may consist of suberect scales as in *sulcatus*, or of hairs, more or less coarse or fine and generally subrecumbent, as in the majority of species; I have allowed considerable weight as an auxiliary character to decided differences in size, color and length of the hairs.

The vestiture of insects is too often confounded with, or considered analogous to the hairy covering of vertebrate animals, and knowing to how great an extent the latter may vary, depending upon climatic conditions of environment, we are sometimes too hasty in concluding that the former must vary in the same way; this is, however, not the case, as a little thought will at once demonstrate.

The hairy coat of the vertebrates, growing from a soft and sensitive skin, is designed primarily as a protection from the vicissitudes of the weather, or to retain the heat which would otherwise be dissipated, to regulate the rapidity of evaporation, and to perform other analogous functions depending upon the fact that vertebrates are warm-blooded, internal-skeletoned animals.

In the articulates,—cold-blooded, external-skeletoned animals,—the conditions are altogether different, and the vestiture, which in a large proportion, for example of the Coleoptera, constitutes one of the most diversified and wonderful characteristics of the organism,¹

¹ The vestiture is often extremely complicated. In *Sitona*, for example, it is quadruplex, each of the four separate constituents probably having its own sphere of utility. First there is a ground covering of wide rounded strigose scales, generally densely placed, secondly a system of short robust piceous

suberves a different purpose and is not apparently subject to change from any of those conditions which affect the hirsute covering of the warm-blooded animals. This is true at any rate of those hairs which are termed tactile and which are very plainly of functional value, but may possibly not apply so rigidly to other forms of vestiture which, for want of any other name, we call ornamental; the degree of structural variation even in these hairs or scales is, however, comparatively slight as far as my experience has led me. It is highly probable that this ordinary or ornamental pubescence in insects is simply a degenerative modification of hairs, which in their original state were tactile and sensory, but which have become functionless through disuse and at the same time more or less changed in structure.

3—Another variable function is the degree of dilatation of the anterior and intermediate tarsi of the male and the vestiture of their under surface, these organs being,—in partial contradiction of all generic diagnoses which have been heretofore published,—occasionally completely undilated and spinose beneath, as for example in *brevicollis*. In the more widely dilated tarsus the under surface is always very densely spongy-pubescent. The two groups into which I have divided the majority of our species, depending upon the amount of dilatation, are of course unnatural, and it may occasionally be difficult to distinguish the dividing line between them, the more strongly dilated tarsi of the second group as in *arenarius*, being approached by the more feebly dilated members of the first group as in *longulus*. The only definite criterion which can be given, is that in the feebly dilated tarsus the second and third joints are never more than very slightly wider than the apex of the fifth.

The impression of the fifth segment is not strictly sexual, being often visible in the female and is always variable; the impression of the abdomen toward base is, however, peculiar to the male and generally quite constant.

pointed or truncate spicules, usually aggregated in clusters, third a system of very sparsely placed long white erect setæ, and finally, each puncture of the striæ has a peculiar minute seta which is unlike any other part of the vestiture. In addition to this the scales of the first system are, on the under surface, often most beautifully and minutely fimbriate or plumose around the circumference. To fathom the mysterious processes of nature which have resulted in such complexity, or to explain how these four systems act in mutual relationship, will most undoubtedly forever be beyond the pale of our feeble understanding—we can only wonder.

It is hoped that the following table which is founded upon very extensive material,¹ may enable the reader to recognize most of our species, but I am only too well aware, because of the considerable number of forms which from lack of material I have left undescribed, that there may be some doubt regarding absolute identifications in some parts of the series. It is to be understood of course that in a genus containing many species, and especially where each species is abundant in individuals as is generally the case in *Blapstinus*, that its members cannot all be equally pronounced or isolated, some of the forms having more nearly the nature of varieties or incipient species than others; but as it is quite impossible to conceive of any definite criterion for distinguishing varieties from true species,—if indeed there is any clearly limited line of demarcation,—I have preferred at present to describe each form separately. It may be stated, however, that the two strongly marked forms *pulverulentus* of the true Pacific fauna and *rufipes* of the San Diego fauna, are each the centre of several closely allied but apparently distinct species, probably developed in comparatively recent times, the first group consisting of *æqualis*, *funebria*, *pulverulentus*, *parallelus* and *inquisitus*, and the second of *crassicornis*, *rufipes* and *elongatus*; a vast amount of study must be expended upon these and other derivative forms before anything definite can be known about their true relationships. *Interruptus* also seems to be a species in process of disruption into geographical races, but in this case the various forms are not distinctly limited:—

Color uniform throughout or with the anterior portions rarely just perceptibly darker	2
Color ferruginous, the elytra black	23
2. —Anterior tarsi strongly dilated in the male.....	3
Anterior tarsi of the male feebly dilated, sometimes undilated.....	16
3. —Form elliptical, convex; surface smooth but very dull and evenly alutaceous; pubescence completely wanting, represented by excessively minute setæ only clearly definable under rather high power and extremely sparse; hind wings very rudimentary, the elytra almost completely connate	4
Form more or less oblong, variable in convexity; surface dull or polished; pubescence always represented by distinct elongate hairs.....	5
4. —Punctures of the elytral striæ extremely feeble, fine and sublinear, the striæ not distinctly impressed	1
Punctures coarse, rounded, very deeply impressed; striæ strongly impressed, coarse.....	2
	dispar

¹ The material before me comprises more than four hundred specimens.

5.—Elytral striæ more or less interrupted; pubescence rather easily removable but distinct in the normal state.....6

Elytral striæ not interrupted; pubescence generally quite persistent.....7

6.—Surface lustre strongly æneous; elytral striæ generally coarsely punctured and very widely and frequently interrupted; pronotal punctures sparser3 **metallicus**

Surface lustre rarely æneous; color generally piceous-black, with the elytra very slightly paler; pubescence denser; elytral striæ generally more finely punctured and less widely and repeatedly interrupted, sometimes very slightly interrupted; pronotal punctures denser; size larger; form more robust, with the prothorax less strongly narrowed from base to apex.

4 **interruptus**

7.—Elytral striæ coarsely punctured; hind wings generally well developed; upper lobe of the eyes unusually large.....8

Elytral striæ strongly impressed, finely punctured toward the suture but rapidly coarsely so laterally; form robust, very convex; pubescence rather short and coarse; wings very rudimentary, the elytra subconnate.

13 **pratensis**

Elytral striæ finely punctured, usually feebly impressed; wings generally more or less rudimentary.....9

8.—Pronotum sparsely punctate, at least toward the middle.

Castaneous-brown, the anterior portions sometimes darker, piceous; size much smaller (4.5–5.0 mm.)5 **fuscus**

Black or piceous-black throughout; size large, never much less than 6 mm. in length.

Rather depressed, the pubescence short, sparse and stiff; abdominal punctures very coarse.....6 **longulus**

More convex, larger; pubescence long.

Elytral striæ feebly impressed and distantly punctured; body much more elongate and parallel7 **validus**

Elytral striæ very strongly impressed and closely punctured...8 **fortis**

Pronotum very densely punctate throughout.

Form robust, oblong; elytral striæ moderately impressed.

Pronotum rather coarsely punctate, the punctures strongly longitudinally confluent throughout, the sides very strongly arcuate, the disk widest at basal third; elytral pubescence longer but finer, consisting of yellow and piceous hairs confusedly intermingled; intervals about five times as wide as the stria punctures9 **dilatatus**

Pronotum rather finely punctate, the punctures not tending to coalesce longitudinally; sides much less strongly arcuate, the disk widest at base; elytral pubescence uniform, bright ochreous-yellow, short, dense, very coarse and conspicuous; intervals very wide and flat, from six to seven times as wide as the stria punctures.....10 **sonoræ**

Form elongate-oval, much narrower; pubescence fine, rather long, sparse, dark and inconspicuous.

Eyes rather smaller; pronotal punctures coarser and generally strongly, longitudinally rugulose toward the sides which are more strongly arcuate; elytral striæ rather strongly impressed.....11 **castaneus**

Eyes very large, their upper lobes separated by about four times their width; sides of the prothorax less strongly arcuate, the pronotum rather more finely and much less confluent punctate; elytral striæ scarcely perceptibly impressed12 **histricus**

9.—Pronotum densely punctate throughout..... 10

Pronotum sparsely punctate, at least toward the middle of the disk 13

10.—Pubescence pale cinereous or yellowish-cinereous, conspicuous..... 11

Pubescence darker, piceous to dark fulvous, not at all conspicuous 12

11.—Size small; pubescence very long; elytral striæ not distinctly impressed.

36 **hospes**

Larger; pubescence shorter, coarser and not quite so conspicuous; elytral striæ distinctly but not strongly impressed.....14 **oregonensis**

12.—Pronotum coarsely punctate, the apex very feebly incurvate, sometimes almost truncate, the apical angles distinctly rounded, the basal very obtuse and generally slightly rounded, at least in the male.

Form subdepressed; elytral striæ extremely feebly impressed15 **niger**

Form very convex; elytral striæ strongly impressed and more coarsely punctured; sides of the prothorax more strongly arcuate; size larger; form more robust16 **cribricollis**

Pronotum more finely punctate; apex more deeply emarginate in circular arc; apical angles not distinctly rounded; basal usually rather prominent, not in the least rounded and not obtuse, the basal sinuations more pronounced.

Wings nearly as long as the elytra; punctures of the elytral series widely separated17 **fuliginosus**

Wings rudimentary but not excessively so; stria punctures very small and closely placed.

Abdominal pubescence long, rather coarse, flavate and conspicuous.

18 **rufipes**

Abdominal pubescence short, dark fulvo-piceous and inconspicuous.

Third antennal joint of the male long, nearly equal to the next two together, tenth fully two-thirds wider than long; elytral striæ distinctly impressed.....19 **crassicornis**

Third antennal joint in the male short, very much shorter than the next two, tenth scarcely one-half wider than long; elytral striæ very feebly impressed; form of body much more elongate.

20 **elongatus**

13.—Wings but moderately rudimentary, always distinctly more than one-half as long as the elytra14

Wings very rudimentary, always distinctly less than one-half as long as the elytra.¹15

14.—Elytral intervals very minutely punctate, the stria punctures much larger and rather distant.

¹ In the case of *æqualis*, *lepidus* and *funeris*, no dissection has been made to determine the form of the wings, but as the elytra are subconnate, and the other characters indicate them to be close homologues of *pulverulentus*, I think that the position here assigned them will prove correct.

- Posterior angles of the prothorax somewhat prominent posteriorly; size larger; stria punctures coarser, especially toward the sides; wings narrow and scarcely two-thirds as long as the elytra21 **mœstus**
- Posterior angles not at all prominent, the base transverse and the sinuations feebler; stria punctures finer, not much coarser laterally; form narrower, more parallel and more depressed; wings broad and fully four-fifths as long as the elytra22 **gregalis**
- Elytral intervals rather coarsely and more densely punctate, the stria punctures finer and very closely placed, the stria scarcely visibly impressed; wings but slightly shorter than the elytra23 **substriatus**
- 15.—Stria punctures very widely separated, the stria scarcely visibly impressed; form narrow and parallel24 **lepidus**
- Stria punctures approximate; form more robust.
- Lustre dull and alutaceous, the stria punctures more perforate and abrupt, forming very regular, even series, the punctures of the intervals rather denser.....25 **æqualis**
- Lustre strongly shining.
- Size large, not less than 6 mm. at least in the female; elytral stria extremely fine and feebly impressed26 **funebis**
- Size smaller always less than 6 mm.
- Wings wide, very small, shorter than the prothorax; elytral stria distinctly impressed27 **pulverulentus**
- Wings very slender, at least as long as the prothorax; elytral stria almost unimpressed.
- Wings with the lower margin strongly sinuate near the apex; size larger; form more convex and subcylindrical28 **parallelus**
- Wings not sinuate near the apex; size smaller; form distinctly more depressed29 **inquisitus**
- 16.—Third antennal joint shorter than the next two combined, subcylindrical or very feebly obconical 17
- Third antennal joint much longer than the next two together; elytra with coarse, deeply excavated, coarsely punctate grooves; head dilated and somewhat prominent before the eyes; pubescence in the form of short, robust, suberect scales22
- 17.—Pubescence heterogeneous, consisting of smaller and darker, and longer and paler hairs, confusedly intermingled.....18
- Pubescence homogeneous.....19
- 18.—Strongly convex, brown; punctures of elytral stria small, rather distant, feeble and scarcely distinguishable from those of the intervals.
- 30 **auripilis**
- Strongly depressed, brown; punctures of the elytral stria distinct.
- 31 **intermixtus**
- 19.—Color dark castaneous to pale reddish-brown20
- Color black.....21
- 20.—Pubescence darker, piceo-fulvous, inconspicuous; form broad, oblong; prothorax very short and transverse; eyes small.....32 **brevicollis**

Pubescence denser, coarser, pale yellowish-cinereous and conspicuous.

Prothorax rather long; eyes large, the upper lobes separated by about four times their width; pubescence shorter.....33 **brunneus**

Prothorax about two-thirds wider than long; eyes smaller, the upper lobes separated by between five and six times their width; pubescence longer.

34 **hesperius**

21.—Punctures of the elytral series fine, impressed.

Pubescence coarse, short, recumbent and squamiform; form oval, very convex35 **vestitus**

Pubescence fine, moderate in length.

Pronotum very densely punctate throughout.....37 **pimalis**

Pronotum sparsely punctate, at least toward the middle; punctures of the elytral striæ distant, closer in the series near the suture.

Oblong-oval, convex; punctures of the series distinct; pubescence short, dark fulvous, rather dense but not conspicuous.

38 **arenarius**

More depressed, generally subcuneiform in the male, parallel in the female; punctures of the elytral series very small; pubescence rather long, moderately abundant, cinereous and somewhat conspicuous.

39 **debilis**

Pubescence excessively short and sparse, setiform, not distinctly visible except by careful examination.....40 **humilis**

Punctures of the elytral series coarse, circular, deeply perforate, very closely placed, being separated generally by scarcely one-half their own diameters; pubescence rather short and coarse, abundant, pale cinereous and extremely conspicuous41 **pubescens**

22.—Vestiture cinereous and conspicuous; elytral intervals scarcely wider than the grooves; pronotum narrowly reflexo-explanate at the sides.

42 **sulcatus**

Vestiture dark piceo-fulvous, very inconspicuous; elytral intervals much wider than the grooves; body more robust; pronotum more broadly explanate at the sides43 **hydropicus**

23.—Integuments not shining; body apparently glabrous.....44 **discolor**

1 **B. alutaceus** Casey.—*B. opacus* Lec.: Proc. Am. Phil. Soc., XVII, p. 420, 1878 (*nom. præocc.*).—Oblong-elliptical, rather strongly convex, black; antennæ fuscous, gradually and distinctly paler toward apex; integuments smooth, very minutely strongly and evenly granulato-reticulate throughout and strongly alutaceous; pubescence almost completely wanting, consisting of excessively sparse and minute erect setæ, only visible under high power. *Head* feebly convex, very minutely, rather evenly and sparsely punctate; upper lobe of eyes well developed; antennæ rather slender, gradually and somewhat feebly incrassate toward apex, joints three to five uniformly and very rapidly decreasing in length. *Prothorax* rather elongate, about three-fifths wider than long, strongly narrowed from base to apex; sides evenly and feebly arcuate; apex distinctly emarginate in circular arc; base transverse, the lateral sinuations strong; disk broadly, evenly convex, very minutely and

sparsely punctate throughout, the punctures a little larger but not distinctly denser laterally. Scutellum relatively very small, triangular, transverse, with narrow explanate polished margin. *Elytra* one-half longer than wide, slightly wider and two and one-half times longer than the prothorax; sides feebly arcuate, together gradually narrowed in apical two-fifths and acutely rounded at apex; disk without impressed striæ but having distant rows of very fine feeble sublineate punctures, which are widely and very unevenly spaced; intervals very minutely sparsely and feebly punctate. *Abdomen* more polished, sparsely and extremely minutely punctate, almost glabrous. *Legs* rather long, the tarsi moderate.

Male.—Anterior tarsi strongly dilated, the first four joints forming an elliptical patella; intermediate feebly but distinctly dilated; both pairs with pads of dense spongy-pubesence beneath; abdomen narrowly and feebly impressed in the middle toward base.

Length 6.5–6.7 mm.; width 3.0–3.2 mm.

Florida (Key West); Texas.

A remarkably aberrant species of rather large size, easily recognizable by its alutaceous, almost glabrous integuments and minute feeble punctuation. The hind wings are excessively rudimentary and relatively smaller than in any other species which I have been able to dissect: they consist of a very slender, nearly opaque, semi-membranous fillet, three or four times as long as wide and not quite one-half as long as the prothorax. The elytra are almost completely connate.

2 **B. dispar** n. sp.—Elongate-elliptical, rather strongly, evenly convex, black; integuments smooth, very minutely evenly and strongly granulato-reticulate, strongly alutaceous; pubescence extremely sparse and short, cinereous, visible but very inconspicuous. *Head* feebly convex, rather finely evenly and somewhat densely punctate, the punctures generally separated by a little more than their own diameters; epistoma deeply sinuate; upper lobes of eye moderate, separated by about five times their own width; antennæ nearly as in *alutaceus*. *Prothorax* rather elongate, about three-fifths wider than long; apex rather strongly, evenly emarginate in circular arc; base transverse, the sinuations distinct; sides rather strongly convergent from base to apex, strongly arcuate especially toward base; disk widest before the base, sparsely and very minutely punctate toward the middle, much more coarsely and densely so toward the sides where the punctures are moderate in size, deep and generally separated by their own diameters. Scutellum as in *alutaceus*. *Elytra* from one-third to one-half longer than wide, just perceptibly wider, and about two and three-fourths times longer than the prothorax; sides broadly but distinctly arcuate, together gradually narrowed behind and somewhat acutely rounded at apex; disk with wide deeply impressed striæ, the striæ very coarsely punctured, the punctures circular, deeply perforate, not much wider than the striæ and distant by from two to four times their own

diameters; intervals rather distinctly convex, about four times as wide as the striae punctures, sparsely and very minutely punctate. *Abdomen* polished, longitudinally rugulose toward base, sparsely, finely punctate, the pubescence very short, sparse and inconspicuous. *Legs* moderate; tarsi long.

Male.—Anterior tarsi strongly, intermediate moderately dilated, nearly as in *alutaceus*; abdomen very feebly impressed or flattened in the middle toward base, the fifth segment almost completely unmodified.

Length 6.7–7.0 mm.; width 3.2–3.4 mm.

Florida (Biscayne Bay). Mr. Schwarz.

This species is also exceedingly distinct in all of its characters, being readily distinguishable from *alutaceus* by its coarser punctuation, visible although extremely short pubescence and strongly punctured elytral striae. The female is a little more robust than the male, with relatively shorter elytra.

3 **B. metallicus** Fabr.—Syst. El. I, p. 143.—Oblong-oval, rather convex, strongly shining with æneous lustre; pubescence very fine, moderate in length, recumbent, cinereous, rather sparse, easily removable and not conspicuous. *Head* strongly transverse, rather finely but deeply punctate, the punctures smaller anteriorly, distinctly separated; upper lobe of eyes moderate; antennae rather slender, moderately clavate, the second joint a little longer than wide and fully two-thirds as long as the third, the latter but very slightly longer than the fourth. *Prothorax* about three-fourths wider than long, rather strongly narrowed from base to apex; sides more strongly arcuate at apical third, nearly straight toward base and apex, the latter broadly emarginate, the angles anteriorly prominent; base transverse, the lateral sinuations strong; disk very finely and sparsely punctate toward the middle, much more coarsely and densely so toward the sides where the punctures are generally separated by scarcely more than their own widths; basal foveae distinct. *Scutellum* well developed, very slightly wider than long, minutely punctate. *Elytra* fully three times as long as the prothorax and, behind the middle, just perceptibly wider, together rather obtusely rounded behind; disk without distinctly impressed striae except toward the suture, where they become very feebly impressed, the striae punctures moderate in size, widely interrupted in sets of one to four or five, those composing the sets rather approximate and separated by about their own diameters; intervals four to five times as wide as the striae punctures, flat, sparsely and very finely punctate. *Abdomen* polished, feebly, longitudinally rugose, very finely, rather sparsely punctate; pubescence fine, sparse, moderate in length, not conspicuous. *Legs* short, the tarsi long.

Male.—Anterior tarsi strongly, the intermediate feebly dilated and densely, finely spongiose beneath; abdomen very narrowly, feebly flattened in the middle toward base, the impression of the fifth segment small, round and rather deep.

Length 4.2–4.8 mm.; width 1.8–2.1 mm.

Canada; Rhode Island; Pennsylvania; Florida.

This is an abundant species, distinguishable by its bright æneous lustre, rather oval form, sparse pubescence and several other characters. The hind wings are well developed, being fully as long as the elytra.

I have before me a well-defined geographical variety of this species from southern Florida. It is much smaller, narrower, more parallel, rather more depressed and with shorter, more parallel-sided and much more sparsely punctate prothorax, the punctures toward the sides being generally separated by fully twice their own diameters. To avoid an increase of names this may be considered as *æneolus* Melsh (Proc. Ac. Phil., III, p. 66). Length 3.7–4.0; width 1.4–1.6 mm.

4 B. interruptus Say.—*Opatrum interr.*: Journ. Ac. Phil., III, p. 264; *luridus* Muls.: Ann. Soc. Agr. Lyons, 1859, p. 193.—Oblong, rather robust and convex, black, the elytra more or less piceous, moderately shining or sub-alutaceous; pubescence rather long and dense, cinereous, conspicuous but easily removable. *Head* transverse, feebly convex, somewhat finely and densely punctate; upper lobes of eye moderate, separated by about five times their own width; epistoma broadly, deeply sinuate; antennæ short and slender, gradually and distinctly clavate toward apex, third and fourth joints subequal in length. *Prothorax* about three-fourths wider than long, very feebly narrowed from base to apex, the sides for two-thirds the length from the base almost straight and just visibly convergent, then broadly, roundly subangulate and more strongly convergent to the apical angles, which are rather prominent and acute; apex broadly emarginate, subtruncate except near the angles; base broadly arcuate in the middle, distinctly sinuate laterally, the basal angles acute and extending posteriorly slightly beyond the middle lobe; disk very deeply and not very finely punctate, the punctures moderately dense toward the middle, very dense laterally; basal foveæ well marked. Scutellum moderate, minutely punctate. *Elytra* about one-half longer than wide, not distinctly wider, and rather less than three times longer than the prothorax, rather abruptly and obtusely rounded behind; sides almost straight; disk with very fine, just visibly impressed striae which are very finely and approximately punctured, the series more or less interrupted; intervals sparsely and rather coarsely punctate. *Abdomen* polished, finely and rather sparsely punctured, the pubescence moderate in length, fine, rather sparse but distinctly visible. *Legs* and *tarsi* moderate in length.

Male.—Anterior tarsi strongly, intermediate more feebly dilated and densely spongy-pubescent beneath; abdomen narrowly and almost imperceptibly flattened in the middle toward base.

Length 4.6–5.2 mm.; width 2.0–2.4 mm.

New York; Minnesota; Colorado; Wyoming.

The series before me represents a wide range of distribution and exhibits more or less variation, chiefly in coloration and in the extent of interruption of the elytral series. In some specimens, more especially the eastern, the striæ are nearly as widely and completely broken up as in *metallicus*, while those from Colorado have almost completely continuous series. The punctuation of the pronotum is rather denser in the western representatives, being sometimes almost subconfluent toward the sides, and the pubescence is generally a little denser. One specimen from New York is as strongly æneous as any specimen of *metallicus* which I have seen, but is more alutaceous in lustre.

This is an abundant species, distinguishable from *metallicus* by its broader, more oblong form, more parallel and more densely punctate prothorax and finer less interrupted striae punctuation.

5 **B. fuscus** n. sp.—Elongate-oval, rather strongly convex and shining, piceous, the elytra paler, dark red-brown; pubescence short, sparse, moderately coarse, dark fulvous in color, not very conspicuous. *Head* feebly convex, rather finely, moderately densely punctate; upper lobes of eye rather large, separated by from four and one-half to five times their own width; antennæ somewhat robust, gradually and rather strongly incrassate toward apex, the third joint very much shorter than the next two. *Prothorax* about two-thirds wider than long, the apex very distinctly narrower than the base, broadly, feebly emarginate in circular arc, the apical angles not distinctly rounded; base transverse, the sinuations broad and rather strong; basal angles obtuse but not at all rounded; sides almost evenly and feebly arcuate; disk densely punctured toward the sides where the punctures are scarcely in mutual contact, sparsely so toward the middle, the punctuation not very coarse. *Elytra* very slightly wider than the prothorax and generally rather more than three times as long; sides parallel and very feebly arcuate; disk with rather coarse and distinctly impressed striae which are very coarsely punctate, the punctures very deep and perforate, circular and generally rather distant, being separated by nearly twice their own diameters; intervals very feebly convex, four to five times as wide as the striae punctures, sparsely and somewhat coarsely punctured. *Abdomen* polished, sparsely and rather coarsely punctured, the pubescence moderate in length, very sparse, fine, pale but inconspicuous. *Legs* moderate in length, rather robust.

Male.—Anterior tarsi strongly dilated, the second joint distinctly longer and rather wider than the third; intermediate much less strongly but distinctly dilated; both pairs with densely but rather coarsely squamulose soles; abdomen rather feebly but distinctly impressed in the middle toward base, the punctuation not very much denser toward the middle of the first segment.

Length 4.5–5.0 mm.; width 1.8–2.1 mm.

Texas (Austin).

This species is abundant in June in the valley of the Colorado River of Texas, and although resembling *castaneus* somewhat, may be easily distinguished by its generally more convex and polished surface, sparser, rather finer and much less rugulose punctuation of the pronotum and more feebly rounded sides of the latter, larger eyes, sparser pubescence, finer and sparser abdominal punctuation and several other characters. The hind wings are well developed.

6 **B. longulus** Lec.—Ann. Lyc. Nat. Hist. N. Y., V, p. 147.—Oblong-elongate, parallel, depressed, polished, piceous-black; legs dark rufous; pubescence very short, stiff and sparse, pale flavo-cinereous but not at all conspicuous. *Head* moderately transverse, feebly convex, not very coarsely, densely punctate, the punctures being densely crowded at the edges; upper lobe of eyes rather larger than usual; antennæ rather long and slender, gradually and feebly incrassate toward apex, third joint very much shorter than the next two together, seventh much longer than wide, eighth scarcely as wide as long. *Prothorax* nearly two-thirds wider than long, the apex but very slightly narrower than the base; sides very strongly arcuate, straight near the base, the latter transverse, the lateral sinuations rather feeble but distinct; basal angles right, rather prominent, not in the least rounded; apex broadly, rather strongly emarginate in circular arc; disk widest at about the middle, moderately coarsely punctate, the punctures decidedly sparse toward the middle, denser but not contiguous toward the sides; basal impressions rather distinct. Scutellum rather small, the polished margin slightly depressed. *Elytra* nearly three times as long as the prothorax, equal in width to the latter, just visibly wider in the female; sides feebly arcuate, rather obtusely, parabolically rounded at apex; disk coarsely and rather strongly striate, the striæ with large deep perforate punctures which are generally separated by a little less than twice their own diameters; intervals feebly convex, coarsely and sparsely punctured. *Abdomen* sparsely and coarsely punctate, the pubescence short, flavate, very sparse and not conspicuous. *Legs* rather long.

Male —Anterior tarsi quite moderately, the intermediate very feebly dilated; both pairs finely, densely spongy-pubescent beneath; abdomen rather broadly, deeply excavated in the middle toward base, the punctures slightly finer and denser along the middle of the first segment, fifth with an oval apical fovea.

Length 5.8–6.8 mm.; width 2.2–2.6 mm.

California; Arizona (Yuma).

A conspicuously distinct species, easily known by its rather elongate parallel depressed form, highly polished integuments, very short and sparse pubescence, and coarse elytral and abdominal punctures. The wings are well developed, extending almost to the apex of the elytra.

In this species the pronotal hypomera are not distinctly impressed, and in several other characters it makes a closer approach to *Mecysmus* than any other.

7 *B. validus* n. sp.—Elongate-oval, moderately convex, dark blackish-castaneous; legs piceo-rufous; integuments rather distinctly alutaceous, the elytra strongly but very minutely granulate-reticulate; pubescence rather long, especially toward the elytral apex, moderately coarse, pale flavate, very sparse but distinct. *Head* transverse, feebly convex, rather coarsely, deeply punctate, the punctures finer and denser toward the edges; upper lobes of eye large, separated by scarcely four times their own width; antennæ rather slender, gradually and feebly dilated toward apex, third joint rather long, nearly as long as the first two together and but slightly shorter than the fourth and fifth, seventh much longer than wide. *Prothorax* nearly three-fourths wider than long, the apex very much narrower than the base, the sides evenly and very strongly arcuate throughout; base transverse, the lateral sinuations distinct; disk much wider just behind the middle than at base, the lateral basal impressions completely obsolete, the punctures rather coarse, sparse near the middle where they are separated by about twice their own widths, thence gradually dense toward the sides but not very coalescent. *Elytra* fully three times as long as the prothorax and, at apical two-fifths, very slightly wider than the latter; disk with rather feebly impressed striæ which are rather coarsely punctate, the punctures deep, perforate and generally separated by about twice their own diameters; intervals five or six times as wide as the stria punctures, nearly flat, finely and sparsely punctured. *Abdomen* finely and very sparsely punctate, the pubescence moderate in length, very sparse, flavate. *Legs* moderate.

Male.—Anterior and intermediate tarsi nearly as in *longulus*; abdomen rather narrowly and feebly impressed in the middle toward base, the punctures broadly dense and rather coarser toward the middle of the basal segment, fifth with a rounded impressed apical fovea.

Length 7.5 mm.; width 3.2 mm.

California (southern).

The single specimen serving as the type of this species differs from the male of *longulus* in its more convex upper surface, alutaceous lustre, much longer pubescence, finer, sparser punctuation of the abdomen, larger size and several other characters. The punctures of the elytral striæ are relatively not quite as coarse as in *longulus*, although of the same general nature, and the intervals are more finely punctured.

8 *B. fortis* Lec.—Proc. Am. Phil. Soc., XVII, 1878, p. 420; *interstitialis* Champ.: Biol. Cent.-Amer., IV, Pt. i, p. 125; *punctulatus* Duv.: Sag. Hist. de Cuba, VII (Sp. ed.), p. 60, 1856 (nom. præocc.)—Oblong-oval, rather feebly convex, black; integuments shining; pubescence moderate in length, fine,

subrecumbent, grayish-brown in color, easily removable, not very dense but distinct in perfect specimens. *Head* rather coarsely, moderately densely punctate, the punctures a little smaller on the epistoma, the latter broadly, strongly sinuate at apex; upper lobes of eye rather large, circular, separated by scarcely more than four times their own width, almost completely surrounded by a fine deep groove; antennæ rather robust, gradually and not very strongly incrassate near the apex, third joint much shorter than the next two, fourth much longer than the fifth. *Prothorax* about three-fifths wider than long, slightly narrowed from base to apex; sides evenly and rather feebly arcuate throughout; apex rather strongly, evenly emarginate in circular arc; base transverse, the lateral sinuations broad and distinct; disk densely punctate, the punctures moderate in size, deep, generally not tending to coalesce longitudinally. Scutellum rather small, polished, minutely, not densely punctate. *Elytra* scarcely perceptibly wider than the prothorax and nearly three times as long; sides parallel and very feebly arcuate, more noticeably so posteriorly, together somewhat acutely rounded behind, coarsely striate, the striæ deeply impressed, coarsely deeply and rather approximately punctate, the punctures circular, perforate and separated generally by about their own diameters; intervals from three to four times as wide as the punctures, convex, rather coarsely deeply and somewhat sparsely punctured. *Abdomen* polished, rather coarsely and sparsely punctate, the pubescence short, fine, very sparse and inconspicuous. *Legs* moderate, the tarsi unusually long.

Male.—Anterior tarsi strongly dilated, the basal joint much narrower than the second, equilatero-triangular, second and third transverse, equal in width; intermediate distinctly but much more feebly dilated, the first joint nearly as wide as, and much longer than the second; both pairs densely spongy-pubescent beneath; abdomen toward base narrowly and distinctly impressed, fifth segment very feebly impressed.

Length 6.4-7.5 mm.; width 2.8-3.3 mm.

Florida; Texas (Galveston and El Paso).

There can be no doubt of the synonymy here proposed. The species resembles *dilatatus* but differs in its somewhat narrower form, rather more shining surface, coarser punctuation, sparser and not longitudinally rugulose pronotal punctuation and longer narrower prothorax, with less strongly arcuate sides. The specimens collected by myself at the points in Texas named above do not differ in the minutest detail from the unique Florida type of LeConte.

This is a very widely diffused species, occurring over the entire southern portion of the North American continent.

9 *B. dilatatus* Lec.—Ann. Lyc. Nat. Hist. N. Y., V, p. 146.—Oblong, rather feebly convex, black, rather feebly shining; pubescence moderate in length, subrecumbent, somewhat stout, consisting of pale flavo-cinereous and dark piceous-brown hairs confusedly intermingled, somewhat dense and rather conspicuous, persistent. *Head* rather small, feebly convex, rather coarsely,

densely punctate, the punctures finer anteriorly; epistoma broadly, deeply sinuate; upper lobes of eye rather large, circular, distinctly convex, almost surrounded by a deep groove, distant by scarcely more than four times their own diameters; antennæ nearly as in *fortis*. *Prothorax* rather more than twice as wide as the head, four-fifths wider than long, feebly narrowed from base to apex; sides strongly arcuate, more distinctly so at basal third; apex rather strongly emarginate in circular arc; base transverse, the lateral sinuations broad and distinct; basal angles very narrowly but distinctly rounded; disk very feebly convex, widest at basal third, rather finely, very deeply and extremely densely punctate throughout, the punctures forming imperfect longitudinal rugæ. Scutellum small, polished, minutely not densely punctate. *Elytra* about three-fourths longer than wide, equal in width to the prothorax and rather less than three times as long; sides parallel and very feebly arcuate, together somewhat acutely rounded behind; disk rather finely striate, the striæ very feebly impressed toward the suture, finely punctured, the punctures round, moderately deep, becoming distinctly larger and deeper laterally, generally distant by from one-half more than to twice their own diameters; intervals nearly flat, from five to six times as wide as the striæ, very finely, rather sparsely punctate. *Abdomen* polished, finely, rather sparsely punctate, the pubescence fine, short, sparse and inconspicuous. *Legs* and *tarsi* rather long.

Male.—Anterior tarsi strongly dilated, the basal joint distinctly narrower than the second, a little wider than long, triangular, second and third transverse, the former slightly the wider; intermediate tarsi very feebly dilated, first and second joints equal in width, both pairs with dense pads of coarse spongy pubescence beneath; abdomen narrowly and feebly impressed in the middle toward base, the fifth segment with a feeble rounded impression.

Length 7.0–7.7 mm.; width 3.1–3.4 mm.

Southern California; Arizona.

A well-marked species, one of the largest of the genus, differing from *fortis*, the only one to which it is allied, in addition to the characters mentioned under that species, in its narrowly rounded basal angles of the prothorax and slightly in the nature of the pubescence, this being generally more uniform and homogeneous in *fortis*. In the female of both of these species the anterior tarsi are decidedly robust, but simply densely setose beneath. In *fortis* the female is decidedly more robust than the male, this being more noticeable than in *dilatatus*. In both, the hind wings are rather well developed, being nearly as long as the elytra.

10 *B. sonoræ* n. sp.—Oblong, robust, moderately convex, dark reddish-brown in color, the integuments dull and finely alutaceous, being very minutely but strongly granulato-reticulate throughout; pubescence short, very robust, dense, bright reddish-yellow in color and conspicuous. *Head* very deeply,

densely, somewhat coarsely punctate; upper lobes of eye moderate, separated by about five times their width; antennæ moderate, gradually and feebly incrassate toward apex, the third joint much shorter than the next two. *Prothorax* nearly four-fifths wider than long, the apex scarcely more than three-fourths as wide as the base, the latter transverse, the sinuations strong; basal angles right and very distinctly, although narrowly, rounded; sides evenly and rather strongly arcuate; disk widest at the base, finely and very densely punctate throughout, the punctures not greatly coalescent. *Elytra* behind the middle a very little wider than the prothorax, about two and one-half times as long as the latter; sides feebly arcuate, broadly, parabolically rounded behind; disk rather finely striate, the striæ somewhat abruptly and distinctly impressed, the punctures moderately coarse, circular, deep, perforate and generally very close, separated by scarcely their own widths; intervals wide, flat, fully seven times as wide as the stria punctures, very finely but not very sparsely punctured. *Abdomen* shining, sparsely, somewhat finely punctate, the pubescence rather long, fine, very sparse but distinct. *Legs* rather long and slender.

Male.—Unknown.

Length 6.3 mm.; width 3.0 mm.

Mexico (Sonora).

The unique specimen is a female but is quite distinct from anything known to me, and apparently not described in the *Biologia Centrali-Americana*. From the fact that the anterior tarsi of this female are rather robust or subdilated, I am disposed to place it in the section with strongly dilated male tarsi. It may be easily known by its robust form—somewhat resembling *dilatatus*,—its smooth but very dull surface, fine, dense pronotal punctuation, evenly, closely punctured elytral striæ, very wide flat intervals and the coarse short ochreous-yellow and abundant pubescence.

11 ***B. castaneus*** n. sp.—Elongate-oval, somewhat depressed, moderately shining, dark blackish-brown; legs dark rufo-piceous; pubescence moderate in length and density, rather fine, dark fulvo-piceous and not conspicuous. *Head* densely deeply punctate; moderately convex; epistoma very broadly, rather feebly sinuate; upper lobes of eye moderate or rather large, separated by nearly five times their width; antennæ rather slender toward base, gradually and moderately incrassate toward apex, the third joint very much shorter than the next two, eighth nearly as large as the ninth. *Prothorax* not very strongly transverse, about one-half wider than long, the apex much narrower than the base, broadly rather strongly emarginate in circular arc; base transverse, the sinuations strong; sides almost evenly and strongly arcuate; basal angles obtuse and generally very narrowly rounded; disk very deeply, rather coarsely and extremely densely punctate, the punctures strongly, longitudinally coalescent, forming short rugæ toward the sides, generally not noticeably sparser in the middle. *Scutellum* moderate, the polished margin distinct.

Elytra subequal in width to the prothorax and about three times as long; sides parallel and just visibly arcuate; apex parabolically rounded; disk with coarse but rather feebly impressed striæ which are coarsely and deeply punctate, the punctures circular, perforate, generally separated by rather less than twice their own diameters; intervals nearly flat, finely and sparsely punctured. *Abdomen* moderately densely and not very finely punctured, the pubescence moderately dense, distinct but not conspicuous. *Legs* robust.

Male.—Anterior tarsi strongly dilated, the second joint much longer than the third; intermediate more feebly but distinctly dilated; abdomen narrowly and very feebly flattened in the middle toward base.

Length 4.7–5.8 mm.; width 1.9–2.5 mm.

. Texas (El Paso); Arizona (Tucson); Colorado.

The typical forms of this species are from El Paso; those from Tucson differ, and apparently form two varieties, in one of which the stria punctures are more approximate, and in the other much coarser with more deeply impressed striæ. The two from Colorado are black, and have the striæ finer and more feebly impressed, the stria punctures being very much smaller. I am quite certain that these variations indicate several distinct species, but the material before me is not sufficiently extensive to enable me to define them exactly.

The wings are well developed and as long as the elytra.

12 **B. histricus** n. sp.—Elongate-oval, widest behind the middle of the elytra, very dark brownish-piceous, moderately convex, rather strongly shining; pubescence moderate in length and density, somewhat coarse, dark fulvous, not conspicuous. *Head* feebly convex, rather finely punctured, not very densely so toward the middle; upper lobes of eye very large and conspicuous, separated by scarcely four times their width; antennæ rather robust, gradually but unusually feebly incrassate toward apex, third joint much shorter than the next two. *Prothorax* fully two-thirds wider than long, the apex broadly, distinctly emarginate and noticeably narrower than the base, the latter transverse, the lateral sinuations very wide, feeble but distinct; basal angles very slightly obtuse but not in the least rounded; sides almost evenly but feebly arcuate throughout; disk rather finely, very densely punctate, the punctures decidedly sparser toward the middle and crowded but not very coalescent laterally. *Scutellum* moderate. *Elytra* fully three times as long as the prothorax and somewhat distinctly wider; sides feebly arcuate; apex somewhat strongly, parabolically rounded; disk with rather coarse but extremely feebly impressed striæ which are somewhat coarsely punctate, the punctures circular, deep and perforate, generally separated by from one-half more than to twice their own diameters; intervals flat, sparsely, rather finely punctured. *Abdomen* polished, finely and sparsely punctate, the pubescence rather long, pale and somewhat conspicuous. *Legs* not very robust.

Male.—Anterior tarsi moderately strongly dilated, the second joint not greatly exceeding the third in length, the latter strongly emarginate; intermediate somewhat feebly but distinctly dilated; abdomen narrowly and very distinctly impressed in the middle toward base.

Length 4.8–5.8 mm.; width 2.0–2.4 mm.

California (Newhall); Lower California.

The two representatives of this species do not indicate any great variability other than that due to sex. The species may be distinguished from *castaneus* by its greater convexity, still larger and very conspicuous eyes, finer, less coalescent punctuation of the pronotum, more feebly arcuate sides of the latter and several other less important characters. The hind wings protrude slightly beyond the elytra in the type.

13 B. pratensis Lec.—Col. of Kans., 1859, p. 15.—Oval, very convex, black; legs piceous; lustre rather dull and alutaceous; pubescence somewhat dense, short and very robust, pale fulvo-cinereous and conspicuous. *Head* finely, deeply, very densely and somewhat confusedly punctate, the punctures becoming very minute anteriorly and at the sides; epistoma broadly, moderately sinuate; upper lobe of eyes small; antennæ rather slender, outer joints gradually incrassate, third shorter than the next two together. *Prothorax* but slightly more than one-half wider than long, rather strongly narrowed from base to apex; sides evenly and strongly arcuate; base transverse, moderately bisinuate; basal angles not rounded; apex very feebly emarginate in circular arc; disk very densely, not very coarsely punctate, the punctures tending to coalesce longitudinally toward the sides, distinctly separated in the middle. Scutellum rather small. *Elytra* scarcely more than two and one-half times as long as the prothorax and, behind the middle, a little wider than the latter, rather coarsely striate, the striae strongly impressed especially toward the sides, rather coarsely and very closely punctate, more finely so toward the suture; intervals finely and rather densely punctured. *Abdomen* polished, somewhat coarsely and not very sparsely punctured; pubescence very short, sparse and inconspicuous. *Legs* rather slender.

Male.—Anterior tarsi strongly, middle more feebly, dilated; abdomen rather narrowly and feebly impressed in the middle toward base.

Length 4.8–6.0 mm.; width 2.2–2.8 mm.

Kansas; Colorado; Nebraska; Texas.

The extensive series before me is rather heterogeneous and almost undoubtedly comprises several distinct varietal forms, the description refers to the typical form from Kansas, which is rather smaller than those from Colorado and very much smaller than the Texan representatives. There is a marked divergence, also, in the closeness of the striae punctuation, the punctures generally being sepa-

rated by rather less than their own diameters toward the suture, but in one specimen from Nebraska they are separated by from two to three times this amount. The pronotal punctuation is very fine and dense in the Texan forms, with but little tendency to coalescence laterally. There are apparently no stable characters, however, upon which to base recognizable species and I therefore leave this subject for future investigation.

The wings are extremely rudimentary, consisting of a very small parallel subopaque cellular fillet, devoid of venation, but slightly more than one-half as long as the prothorax, one-fifth as long as the elytra, and rather more than twice as long as wide. The elytra are subconnate.

14 **B. oregonensis** n. sp.—Oblong-oval, rather strongly convex, alutaceous in lustre, grayish-black; legs dark rufous; pubescence moderate in length, rather sparse but coarse, pale yellowish-cinereous in color and very distinct, easily removable. *Head* moderately transverse and convex, rather finely and feebly punctate, the punctures a little coarser and longitudinally subcoalescent toward the middle of the vertex; upper lobe of eyes moderate, surrounded except posteriorly by a very deep impressed groove; antennæ moderate, gradually and feebly incrassate toward tip, third joint short, not twice as long as the second and very much shorter than the next two, joints three to five uniformly and very rapidly decreasing in length. *Prothorax* rather transverse, about three-fourths wider than long, very feebly narrowed from base to apex; sides almost evenly and rather strongly arcuate in the male, straighter or even very broadly sinuate toward base, the latter transverse, the lateral sinuations strong, the basal angles right, not at all rounded and rather prominent; disk finely, very densely and rather feebly punctured, a little more sparsely so toward the middle, tending to coalesce longitudinally toward the sides. *Scutellum* moderate, ogival. *Elytra*, behind the middle, quite distinctly wider than the prothorax, scarcely three times as long as the latter; sides distinctly arcuate posteriorly; disk very finely striate, the striae exceedingly feebly impressed and not much more strongly so externally in the female, but rather strongly impressed throughout in the male, very finely and closely punctured throughout; intervals usually slightly convex in the male and flat in the female, very finely and rather sparsely punctate. *Abdomen* polished, finely, not densely punctate, the pubescence short and fine, pale and distinct but not conspicuous. *Legs* rather slender.

Male.—Anterior tarsi strongly dilated, the second joint decidedly longer than the third; intermediate very feebly dilated; both pairs rather coarsely and not very densely squamplose beneath; abdomen rather broadly and feebly but distinctly impressed in the middle toward base, fifth segment strongly impressed.

Length 5.0-5.5 mm.; width 2.1-2.4 mm.

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Oregon.

With the typical representatives from Oregon I have associated two females which, however, probably represent distinct but closely allied species. One of these from Benicia, California, is much larger and wider, with rather deeper more even pronotal punctuation, very dense throughout but not coalescent, the other from southern Idaho, having the pronotal punctuation quite sparse toward the middle and rapidly much denser toward the sides; this specimen is also larger and very convex, with the abdomen dull. In the absence of males I think it better to leave these species undescribed, and the above description and measurements apply only to the Oregon specimens.

This species is not closely related to any other, but resembles *substriatus* in some of its characters. The wings are rather well developed, being but slightly shorter than the elytra.

15 B. niger n. sp.—Oblong-elongate, parallel, rather depressed, black; legs dark rufo-piceous; integuments somewhat shining; pubescence short, fine, dark piceo-fulvous, rather abundant but very inconspicuous. *Head* strongly transverse, feebly convex, broadly, distinctly sinuate at apex, deeply, moderately coarsely and very densely punctate; upper lobe of eyes rather small; antennæ somewhat slender, gradually and moderately incrassate toward apex, third joint much shorter than the next two, seventh longer than wide, eighth triangular, as wide as long, tenth slightly wider than long. *Prothorax* about two-thirds wider than long, the apex distinctly narrower than the base; sides evenly and rather strongly arcuate throughout; base transverse, the sinuations feeble but distinct, the basal angles rather broadly obtuse but generally not appreciably rounded; apex extremely feebly incurvate, the apical angles distinctly and rather broadly rounded; disk rather coarsely deeply and very densely punctate throughout, the punctures very coalescent longitudinally toward the sides. *Scutellum* small. *Elytra* about three times as long as the prothorax and equal in width to the latter; sides parallel, scarcely visibly arcuate, parabolically and not very acutely rounded behind; disk very finely striate, the striæ feebly impressed and very finely, rather feebly punctate, the punctures generally separated by about one-half more than their own diameters; intervals flat, very finely, sparsely punctured. *Abdomen* coarsely and not very sparsely punctate, the pubescence moderate in length, very fine, sparse, dark in color and not at all conspicuous. *Legs* somewhat short and robust.

Male.—Anterior tarsi strongly dilated, the second and third joints subequal; intermediate much more feebly but distinctly dilated; abdomen with an elongate-oval feeble impression before the middle, in which the punctuation is not distinctly denser.

Length 4.8–5.6 mm.; width 1.8–2.2 mm.

Arizona (Peach Springs).

The wings are moderately developed, rather distinctly hyaline and iridescent, slender, a little more than three times as long as wide, distinctly veined, about one-half longer than the prothorax and nearly three-fourths as long as the elytra.

This species is not closely allied to any other here described and may be easily recognized by its parallel depressed form, very fine elytral and coarse abdominal punctuation, and structure of the hind wings. From *rufipes*, which it most nearly resembles in size of the wings, it may be at once separated by its more depressed form, shorter prothorax, feebler, finer elytral striæ and darker legs.

16 ***B. cribricollis*** n. sp.—Oblong, rather strongly convex, moderately shining, black; legs rufous; pubescence rather long, fine, somewhat sparse, dark piceo-fulvous and not conspicuous. *Head* strongly transverse, feebly convex, very deeply, rather coarsely and densely punctate; upper lobe of eye moderate; antennæ rather robust, gradually but very moderately incrassate through the four outer joints, third rather less than twice as long as the second and very much shorter than the next two together. *Prothorax* moderately transverse, scarcely two-thirds wider than long, feebly narrowed from base to apex, the sides evenly and strongly arcuate throughout; base transverse, the sinuations rather feeble; basal angles distinctly obtuse and very narrowly rounded; apex very feebly emarginate in circular arc, the apical angles narrowly although quite distinctly rounded; disk evenly convex, coarsely, very deeply and extremely densely punctate throughout, the punctures but slightly coalescent toward the sides. *Scutellum* moderate, rather transverse. *Elytra* scarcely three times as long as the prothorax and, behind the middle, very slightly wider, broadly, parabolically rounded behind; sides feebly arcuate; disk finely striate, the striæ rather broadly but moderately impressed, much more strongly so toward the sides and apex, somewhat finely but deeply and very distinctly punctured, the punctures generally separated by a little less than twice their own diameters; intervals very feebly convex, much more strongly so laterally, very finely and rather sparsely punctate. *Abdomen* polished, rather coarsely and moderately sparsely punctate, the pubescence rather short and sparse but pale flavo-cinereous and distinct. *Legs* robust.

Male.—Anterior tarsi moderately dilated, the second and third joints subequal, the latter with the apical emargination rather broad and feeble; intermediate very feebly dilated; both pairs rather coarsely but densely squamulose beneath; abdomen broadly and very feebly impressed in the middle toward base.

Length 5.8 mm.; width 2.5 mm.

Arizona.

This species is quite distinct from any other known to me in its coarse deep and very dense, but at the same time not greatly coales-

cent, pronotal punctuation, by the unusually coarse abdominal punctures and, for the present group, unusually feebly dilated anterior tarsi of the male, the latter character allying it with *longulus* and *validus*. I have not been able to examine the wings as the type is unique.

17 *B. fuliginosus* n. sp.—Oblong-elongate, parallel, strongly convex, rather dull, piceous-black; legs dark rufo-ferruginous; pubescence short, fine, dark subpiceous, inconspicuous. *Head* feebly convex, rather finely punctate, densely so laterally but rather more coarsely and decidedly more sparsely along the middle throughout the length; upper lobe of eyes moderate, rounded; antennæ moderate, gradually and distinctly incrassate through the last four joints, third much shorter than the next two. *Prothorax* rather less than one-half wider than long, slightly narrower at apex than at base, the sides very evenly and moderately arcuate throughout; base transverse, the sinuations rather strong; basal angles right, not at all rounded; apex feebly, evenly emarginate in circular arc; disk evenly convex, very densely, rather finely punctured, a little more sparsely so toward the middle, the punctures toward the sides having but slight tendency to coalesce, although extremely dense. *Scutellum* moderate, densely punctate, a longitudinal line and the apex broadly polished and impunctate. *Elytra* scarcely wider, and fully two and one-half times longer than the prothorax, evenly rounded at apex; sides feebly arcuate; disk very finely striate, the striæ very feebly impressed but a little more distinctly so laterally, very finely but deeply punctured, the punctures very unevenly but in general remotely spaced, separated by from two to four times their own diameters; intervals nearly flat, finely and rather sparsely punctate. *Abdomen* somewhat dull, finely and not very sparsely punctate, the pubescence very short, rather fine, somewhat abundant, pale flavo-cinereous and distinct. *Legs* moderate in length, rather robust.

Male.—Anterior tarsi very strongly dilated, the second joint not much longer than the third, the latter deeply emarginate above at apex; intermediate distinctly dilated, more elongate, but scarcely more than two-thirds as wide as the anterior; both pairs densely spongiöse beneath; abdomen very broadly, feebly impressed in the middle toward base, with the punctures slightly but indefinitely denser.

Length 6.0 mm.; width 2.5 mm.

California (Sacramento).

The singular and unusual median impunctate line of the scutellum may possibly be accidental in the only known specimen.

This species is quite distinct and may be distinguished by its dull lustre, very feebly impressed striæ which are very remotely punctured, by the short pubescence especially of the abdomen, and other

characters. The anterior tarsi of the male are rather more strongly dilated than in any other species.

The wings are well developed, being nearly as long as the elytra.

18 **B. rufipes** n. sp.—Elongate-oval, strongly convex, rather dull, piceous-black; legs rufo-ferruginous; under surface piceous to rufo-ferruginous; pubescence fine, rather long, moderately dense, dark piceous in color and very inconspicuous. *Head* wider than long, feebly convex, strongly and densely punctate; epistoma rather narrowly and deeply sinuate; upper lobe of eye rather small; antennæ rather long and slender, the last three joints forming a somewhat abrupt loose club, third joint twice as long as the second, much longer than the fourth, eighth subtriangular, nearly as long as wide, eleventh somewhat longer than wide and slightly narrower than the tenth. *Prothorax* somewhat elongate, scarcely one-half wider than long, the sides very feebly convergent from base to apex, evenly and rather strongly arcuate; base transverse, the sinuations distinct; basal angles very slightly obtuse, not distinctly rounded; apex very feebly emarginate in circular arc; disk evenly convex, rather strongly, deeply, very densely punctate, the punctures a little sparser near the middle but not separated by more than their own diameters, very dense, sometimes contiguous but not distinctly coalescent toward the sides. Scutellum broadly parabolic. *Elytra*, behind the middle, a little wider than the prothorax, nearly three times as long as the latter; sides rather distinctly arcuate; apex parabolic; disk finely striate, the striæ rather distinctly impressed, more strongly so toward the suture but not noticeably toward the sides, finely and very approximately punctured in the female, more coarsely and distantly so in the male; intervals very feebly convex, very finely and sparsely punctate. *Abdomen* finely and rather sparsely punctate, rather coarsely but sparsely pubescent, the hairs very long, pale flavate and conspicuous. *Legs* rather short, the femora robust.

Male.—Anterior tarsi strongly dilated, the basal joint triangular and but slightly more than one-half as wide as the second, the latter about equal in length and width to the third, the latter broadly emarginate; intermediate rather strongly dilated; both pairs densely spongiöse beneath; abdomen rather narrowly and feebly impressed in the middle toward base.

Length ♂ 5.0 mm., ♀ 5.0–6.0 mm.; width ♂ 1.9–2.1 mm., ♀ 2.2–2.6 mm.

California (San Diego); Arizona; Texas?

This species belongs to the San Diego fauna, perhaps extending through to Western Texas; it is represented in the middle coast regions of California by *elongatus*, in the high Sierras by *inquisitus*, and in the desert regions of the Humboldt Basin by *crassicornis*. It is remarkable, in common with *pulverulentus*, for the unusual difference in form and size between the male and female, the former being much the more slender; it is further distinguishable from its allies by its usually bright rufo-ferruginous legs, duller lustre and longer, paler and more conspicuous abdominal pubescence.

The wings are not so rudimentary as in its allies or *pulverulentus*, being rather wide, subhyaline, with two strong discal veins; they are fully one-half longer than the prothorax and two-thirds as long as the elytra.

19 **B. crassicornis** n. sp.—Oblong, the sides nearly parallel, rather robust, moderately convex, somewhat dull in lustre, black; legs dark rufous; pubescence short, rather abundant but dark fulvo-cinereous in color and not at all conspicuous. *Head* strongly transverse, feebly convex, deeply punctate, the punctures very dense, somewhat sparser and coarser toward the middle; upper lobe of eyes small; epistoma distinctly but moderately sinuate; antennæ unusually robust, the three last joints much wider and forming a strong loose club, third joint rather long, nearly as long as the next two combined, eighth distinctly wider than the seventh and wider than long, tenth rather wider than either the ninth or eleventh. *Prothorax* rather elongate, scarcely one-half wider than long, the apex but slightly narrower than the base; sides feebly arcuate, rather more strongly so in the middle and nearly straight toward base, the latter transverse, the sinuations moderate; basal angles not at all rounded; disk deeply, moderately coarsely and very densely punctate throughout, the punctures not decidedly coalescent laterally. Scutellum moderate, almost confluent punctured. *Elytra* subequal in width to the prothorax and two and one-half times as long, the sides very feebly arcuate, rather broadly, parabolically rounded behind; disk finely striate, the striae rather widely feebly impressed, a little more strongly so externally and near the suture, very finely, approximately punctate; intervals very slightly convex, minutely, sparsely punctate. *Abdomen* shining, finely but not very sparsely punctate, the pubescence short, very fine, dark brownish in color and not at all conspicuous. *Legs* moderately robust.

Male.—Anterior tarsi strongly, the intermediate moderately, dilated, the second joint of the former longer and also somewhat wider than the third which is deeply emarginate; both pairs densely spongiose beneath; abdomen rather broadly, feebly impressed in the middle toward base, with the punctures narrowly denser along the middle of the first segment.

Length 5.6 mm.; width 2.3–2.4 mm.

Nevada (Reno).

Moderately abundant near the Truckee River. I was at first inclined to regard this as identical with *rufipes*, but more careful study convinced me that they cannot be associated together. The present species differs in its much finer, shorter abdominal pubescence, rather longer legs, in the fact that the male and female are nearly similar in form and size, and in the form of the wings which are nearly as in *inquisitus*, very slender and elongate, although decidedly less than one-half as long as the elytra.

The antennæ are distinctly more robust and, especially, with a

much broader club than in any of the allied species and the third joint is more elongate.

20 **B. elongatus** n. sp.—Elongate-oval, strongly convex, black; legs piceous-black; integuments dull; pubescence rather short, sparse, dark fulvo-cinereous and inconspicuous. *Head* transverse, feebly convex, rather finely, deeply, nearly evenly and very densely punctate; epistoma broadly and unusually feebly sinuate; upper lobe of eyes small; antennæ rather robust, very evenly, gradually but moderately incrassate from the seventh joint, third short, scarcely twice as long as the second and much shorter than the next two together, eleventh rather longer than wide, narrowly truncate at apex and scarcely visibly narrower than the tenth. *Prothorax* rather elongate, about two-fifths wider than long, very feebly narrowed from base to apex, the sides almost evenly and rather feebly arcuate; base transverse, the sinuations moderate; basal angles rather more than right, not at all rounded; apex feebly emarginate in circular arc; disk evenly convex, very densely punctate, the punctures fine toward the middle where they are generally separated by scarcely their own diameters, a little coarser, very dense and with a slight tendency to longitudinal coalescence laterally. *Scutellum* moderate, densely punctate. *Elytra*, just behind the middle, slightly wider than the prothorax, about two and two-thirds times as long as the latter, parabolically and somewhat broadly rounded behind; sides distinctly but broadly arcuate; disk very finely, feebly striate, the sutural and outer striæ very slightly more distinct, very finely feebly and approximately punctate; intervals nearly flat, finely and sparsely punctate. *Abdomen* shining, rather rugulose, finely, sparsely punctate, the pubescence short, fine, sparse, rather dark and not conspicuous. *Legs* rather long and slender.

Male.—Anterior tarsi very strongly dilated, the second joint much longer than the third; intermediate less strongly dilated; abdomen broadly and feebly impressed in the middle toward base; the punctures crowded and dense only in a small oval area in the anterior half of the basal segment.

Length 5.6 mm.; width 2.2 mm.

California (Lake Co.).

The two specimens before me are males, and from their narrow slender form it is probable that the female will prove to be robust as in *rufipes*; they indicate a species rather closely allied to *rufipes*, but differing conspicuously in the nature of the abdominal pubescence, also in the somewhat larger size and longer piceous-black legs. The antennæ are nearly as in *rufipes*, but are more gradually incrassate, the three outer joints not being at all abruptly wider as is the case in that species.

I have not been able to inspect the wings, but they are undoubtedly rudimentary.

21 *B. moestus* Melsh.—Proc. Ac. Phila., III, p. 65.—Oval, slightly inflated behind, rather strongly convex, black, strongly shining; pubescence fine, short, pale yellowish-cinereous in color, not dense. *Head* transverse, feebly convex, very deeply, moderately coarsely and densely punctate, the punctures abruptly finer along the broadly sinuate epistomal apex; upper lobe of eyes moderate, rounded; antennæ black, robust, gradually incrassate toward apex, third joint scarcely twice as long as the second, much shorter than the next two, eleventh wider than long, fully as wide as the tenth. *Prothorax* nearly two-thirds wider than long, widest at two-fifths the length from the base; sides feebly convergent from base to apex, strongly, almost evenly arcuate, straighter or even feebly subsinuate toward base, the latter transverse, the lateral sinuations very strong, the basal angles slightly acute, not in the least rounded and rather prominent; apex broadly emarginate in circular arc, the angles not at all prominent and very narrowly rounded; disk very deeply and perforately punctate, the punctures finer and sparse toward the middle, coarser and denser but not at all contiguous or confluent toward the sides, usually abruptly very fine and sparse along the acute marginal bead, especially toward the base. *Scutellum* moderate, very finely punctate. *Elytra* with the sides very distinctly arcuate, especially behind the middle where they are distinctly wider than the prothorax, parabolically rounded at apex and about two and one-half times as long as the prothorax; disk with very fine feebly impressed striæ toward the suture, which become rapidly much coarser and more deeply impressed laterally; striæ finely punctate, more coarsely so laterally; punctures elongate and posteriorly evanescent, generally separated by twice their own widths; intervals very finely, somewhat sparsely punctured. *Abdomen* polished, finely, rather sparsely punctate, very sparsely clothed with short inconspicuous pubescence. *Legs* rather short, the tarsi long.

Male.—Anterior tarsi strongly dilated, the basal joint much wider than long and distinctly narrower than the second and third, the latter short, subequal, transversely crescentiform; middle tarsi very distinctly dilated, compact, the three basal joints equal in width; both pairs densely spongy-pubescent beneath; abdomen not distinctly modified.

Length 4.7–5.4 mm.; width 2.1–2.4 mm.

New Hampshire; Rhode Island; Virginia.

This, the only eastern species of the ordinary type, may be easily identified by its intense black color, shining, rather sparsely punctate integuments and prominent basal angles of the prothorax, as well as several other characters. The wings are not well developed, consisting of a long slender hyaline fillet, nearly one-half longer than the prothorax and three-fifths as long as the elytra.

22 *B. gregalis* n. sp.—Oblong-oval, moderately convex, black; antennæ piceous-black; legs dark rufo-piceous; integuments polished; pubescence fine, rather short and sparse, pale fulvo-cinereous and not conspicuous. *Head*

about two-fifths wider than long, not very coarsely but deeply punctate, the punctures rather elongate, distinctly separated transversely, but tending to coalesce longitudinally; epistoma broadly sinuate; upper lobe of eyes moderate or rather small, rounded; antennæ moderate, gradually incrassate toward apex, third joint about three-fourths longer than the second, much shorter than the next two together, eleventh as long as wide, truncate, rather distinctly wider than the ninth. *Prothorax* about three-fourths wider than long; sides feebly convergent from base to apex, moderately and very evenly arcuate throughout; base transverse, the lateral sinuations moderately distinct, the basal angles very slightly obtuse, not rounded but not prominent; apex broadly, evenly emarginate in circular arc; disk rather densely punctate, the punctures deep, moderate in size, somewhat elongate, not much sparser toward the middle, tending slightly to coalesce longitudinally throughout the disk, but distinctly separated transversely. Scutellum moderate. *Elytra* rather less than three times as long as, and, behind the middle, a little wider than, the prothorax; sides distinctly arcuate posteriorly, together evenly rounded at apex; disk finely striate, the striæ feebly impressed, not appreciably more deeply so toward the sides, finely punctured, the punctures feeble and generally separated by from one-half more than to twice their own diameters; intervals nearly flat, from four to five times as wide as the stria punctures, very finely and sparsely punctured. *Abdomen* polished, very finely and somewhat sparsely punctate, the pubescence rather long, moderately dense and distinct. *Legs* and *tarsi* moderate.

Male.—Anterior tarsi strongly dilated, the basal joint slightly wider than long, narrower than the second and third, the latter equal in width, transverse, the apex broadly sinuate toward the middle; intermediate rather feebly dilated; both pairs densely spongy-pubescent beneath; abdomen broadly and more or less feebly impressed in the middle toward base.

Length 3.8–4.6 mm.; width 1.6–2.0 mm.

Washington State; California (Placer Co. and Lake Tahoe); Wyoming (Laramie); Colorado (Veta Pass).

The specimens from Lake Tahoe are rather smaller and narrower than the others, with the punctuation of the pronotum tending to become finer and sparser toward the middle, while those from Wyoming have the entire surface of this part almost longitudinally rugulose; the typical forms are from Washington State. The series before me is very extensive, and the extreme forms do not present any tangible specific characters.

This species somewhat resembles *pulverulentus*, but may be distinguished at once by its smaller size, more depressed form and more developed wings. The latter in the present species are relatively a little longer than in *mæstus*, and broader, hyaline, about four-fifths longer than the prothorax and nearly five-sixths as long as the elytra.

23 **B. substriatus** Champ.—Biol. Cent.-Amer. Col., IV, Pt. 2, p. 128; *anthracinus* Sturm, i. litt.

I have applied this name to a series which, in general, very reasonably satisfies the description above cited. The specimens are from Montana, Wyoming, Colorado and New Mexico, being confined to the more elevated regions of the Rocky Mountains. The species is black throughout, rather robust, oblong, moderately convex, distinctly shining and with the sides nearly parallel. The striæ of the elytra are exceedingly feebly impressed, very finely, rather closely punctured and, in some of the specimens, almost confused toward base with the somewhat unusually coarse punctures of the flat intervals. The anterior tarsi of the male are strongly dilated, the intermediate very distinctly, although less strongly so, and the wings are well developed, being fully as long as the elytra. The punctures of the pronotum are rather coarse, decidedly elongate, closely crowded but not greatly coalescent laterally, and usually very slightly sparser toward the middle in the female, and more decidedly so in the male. The latter sex resembles the female in form but is rather smaller. Length 5.0–5.5 mm.; width 2.1–2.6 mm.

24 **B. lepidus** n. sp.—Narrow, elongate-oval, moderately convex, gradually narrowed behind from near the middle of the elytra, black, moderately shining or subalutaceous; pubescence moderate in length, fine, rather sparse, dark piceo-cinereous and not conspicuous. Head fully one-half wider than long, finely, rather densely punctate; upper lobe of eyes moderate, rounded; antennæ rather slender, the last three joints somewhat abruptly wider, third one-half longer than the second and a little longer than the fourth, eleventh somewhat pointed and a little narrower than the tenth. Prothorax about two-thirds wider than long, the sides very feebly convergent from base to apex, feebly arcuate anteriorly, broadly and extremely feebly sinuate in the basal half; base transverse, the lateral sinuations strong; basal angles right, not in the least rounded; apex broadly emarginate in circular arc; disk finely punctate, the punctures equal in size throughout, separated by about twice their diameters toward the middle and rather denser laterally, but without any marked tendency to coalesce. Scutellum moderate, ogival, rather distinctly wider than long. Elytra about two and one-half times as long as the prothorax, subequal in width to the latter, the sides parallel toward base and scarcely visibly arcuate; disk very finely striate, the striæ feebly impressed, not becoming stronger laterally, very finely punctate throughout the width, the punctures generally separated by two or three times their own diameters; intervals nearly flat, very finely, rather sparsely and unusually feebly punctate. Abdomen polished, very finely and sparsely punctate, the pubescence short, cinereous, distinct but not conspicuous. Legs well developed; tarsi slender.

Male.—Anterior tarsi moderately strongly dilated, second and third joints subequal, the latter strongly angularly emarginate in the middle of its dorsal apex; intermediate slender, scarcely perceptibly dilated; both pairs spongiose beneath; abdomen narrowly and feebly flattened in the middle toward base, the punctures rather abruptly very dense in a large median area of the basal segment, and less conspicuously so on the second segment, fifth with a deep rounded, impressed fovea.

Length 3.9–4.2 mm.; width 1.6–1.8 mm.

Texas.

A small narrow species, allied by the formation of the sides of the prothorax in the neighborhood of the basal angles, to *mæstus*, but abundantly distinct in its narrower form, less convexity, finer pronotal punctures and, especially, by the finer punctures of the elytral striæ, these not becoming more strongly impressed laterally. It is still more widely separated because of the notably more feeble dilatation of the anterior tarsi of the male and its more slender antennæ.

25 *B. æqualis* n. sp.—Elongate-oval, narrow, strongly convex, alutaceous in lustre, black; pubescence fine, rather sparse, moderate in length, dark fulvo-cinereous in color and not very conspicuous. *Head* moderately transverse and convex, somewhat finely and densely punctate, the punctures tending to coalesce longitudinally; upper lobe of eyes moderate, rounded; epistoma broadly, distinctly sinuate; antennæ rather slender, gradually incrassate through the last four joints, third not quite twice as long as the second and much shorter than the next two, eleventh scarcely as wide as the tenth, the sensitive terminal pubescence unusually fine. *Prothorax* about three-fifths wider than long; sides feebly convergent from base to apex, rather feebly and very evenly arcuate throughout; base transverse, the lateral sinuations distinct; basal angles very slightly obtuse, not prominent but not distinctly rounded; apex broadly emarginate in circular arc; disk moderately coarsely, densely punctate, the punctures tending slightly to coalesce longitudinally, rather sparser toward the middle and decidedly finer, but denser toward the sides. *Scutellum* moderate, ogival. *Elytra* about equal in width to the prothorax and between two and one-half and three times longer, rather acutely and parabolically rounded at apex; sides parallel and just visibly arcuate; disk finely striate, the striæ rather feebly impressed throughout the width but distinct, finely, evenly and approximately punctured, the punctures distant generally by about their own diameters; intervals nearly flat, very much more finely but not very densely punctate. *Abdomen* rather finely and densely punctate, more shining, the pubescence rather distinct. *Legs* well developed.

Male.—Anterior tarsi strongly dilated, the second and third joints subequal in length and width; intermediate feebly but very distinctly dilated, with the second joint rather wider than either the first or third; both pairs with dense spongiose pads beneath; abdomen rather narrowly and strongly impressed in

the middle toward base, the punctures very dense toward the middle of the basal segment, fifth segment with a small strong rounded impression.

Length 4.5 mm.; width 1.9 mm.

California (San Bernardino).

This species resembles *gregalis* but differs in its more convex form, duller lustre, much more approximately punctate elytral striæ, notably denser abdominal punctuation, stronger basal impression of the abdomen in the male and, especially, in the structure of the anterior tarsi of that sex. In *gregalis* the third joint is distinctly shorter than the second, while in *æqualis* the second joint is not only longer than in *gregalis*, but is not conspicuously longer than the third.

In *æqualis*, contrary to the general rule, the pronotal punctures become rather finer laterally.

The type is unique. There are two specimens before me from Utah which indicate a closely allied but distinct species.

26 **B. funebris** n. sp.—Oblong-oval, moderately convex, black; legs dark rufo-piceous; integuments rather strongly shining; pubescence short, coarse, very sparse, easily removable, pale fulvous in color and distinct. *Head* transverse, feebly convex, rather finely and densely punctate; upper lobe of eyes small; antennæ not very robust, the three outer joints somewhat abruptly but not greatly dilated, third joint much shorter than the next two, eleventh much narrower than the tenth. *Prothorax* about one-half wider than long, feebly narrowed from base to apex; sides feebly arcuate, straight or very feebly, broadly sinuate toward base, the latter transverse, with moderate sinuations; basal angles right, not at all rounded; apex feebly emarginate in circular arc; disk evenly convex, rather finely, moderately densely punctate toward the middle where the punctures are generally separated by distinctly more than their own diameters, distinctly larger and very dense near the sides but with slight tendency to longitudinal coalescence. *Scutellum* rather large, transversely ogival, finely, rather densely punctate. *Elytra* scarcely wider than the prothorax and nearly three times as long, rather broadly, parabolically rounded behind; sides feebly arcuate, rather more distinctly so behind; disk with very fine striæ which are extremely feebly impressed and very finely, rather approximately punctured, rather more strongly impressed and very slightly more coarsely punctate externally; intervals flat toward the suture, more convex laterally, finely, sparsely punctate. *Abdomen* shining, finely, sparsely punctured and with coarse, sparse, pale flavo-cinereous pubescence, moderate in length and quite conspicuous. *Legs* rather long.

Male.—Unknown.

Length 6.0–7.0 mm.; width 2.7–2.9 mm.

Southern California.

The only two examples are unfortunately females, but the species

could only be confounded with *rufipes*, from which it differs in its much more shining surface, more oblong and less convex form, greater size, much more feebly impressed elytral striæ, and especially in its much sparser and less persistent, shorter, coarser and paler elytral pubescence. The abdominal pubescence is nearly as in *rufipes*, but is a little shorter.

27 B. pulverulentus Mann.—Bull. Mosc., 1843, II, p. 276.—Elongate-oval, strongly convex, black throughout, polished; pubescence dark fusco-cinereous in color, rather long but sparse and inconspicuous. *Head* much wider than long, feebly convex, somewhat strongly and densely punctate, the punctures sometimes a little sparser along the middle, not confluent; upper lobe of eyes moderate, rounded; antennæ rather robust, gradually and moderately incrassate through the last four joints, third scarcely twice as long as the second but distinctly longer than the third, eleventh fully as long as wide, narrowly truncate at apex, as wide as the tenth. *Prothorax* rather elongate, scarcely more than one-half wider than long; sides very feebly convergent from base to apex, feebly arcuate, straight or extremely feebly sinuate toward base, the latter transverse, the lateral sinuations distinct; basal angles very slightly obtuse, not in the least rounded; apex feebly emarginate in circular arc; disk sometimes slightly flattened or subexplanate toward the basal angles, somewhat coarsely and densely punctate, the punctures rather unevenly distributed but usually separated by nearly twice their diameters toward the middle, denser but not distinctly coalescent toward the sides. Scutellum small, ogival. *Elytra* about two and one-half times as long as the prothorax, scarcely perceptibly wider than the latter, rather acutely parabolic at apex; sides parallel and rather distinctly arcuate; disk with rather fine striæ which are somewhat distinctly and broadly impressed, not much more strongly so externally but usually more distinctly so near the suture, the striæ with fine but deep punctures, generally separated by one-half more than their own diameters; intervals very feebly convex, somewhat coarsely and very sparsely punctate. *Abdomen* finely, sparsely punctate, the pubescence distinct but short and sparse, dark fusco-cinereous and not conspicuous. *Legs* moderate.

Male.—Anterior tarsi very strongly dilated, the third joint distinctly shorter than the second and strongly, angularly emarginate; intermediate rather strongly dilated, the second joint notably wider than the first and a little wider than the third; both pairs densely spongiöse beneath; abdomen rather narrowly and distinctly impressed in the middle toward base, the punctures not distinctly denser in the middle of the basal segment, fifth segment with a feeble oval impression; body notably more slender than in the female.

Length ♂ 4.5–4.8 mm., ♀ 4.7–5.5 mm.; width ♂ 1.8–2.0 mm., ♀ 2.1–2.3 mm.

California (Mendocino, San Francisco, and Monterey).

This is the commonest species about San Francisco, and in fact is the only one which exists in that locality to any great extent; it is usually confounded in our cabinets with several other species

here described, and especially *rufipes*, which is more southern in habitat. It may be easily distinguished from those to which it is more closely allied by its polished surface—pruinose when living,—the rather coarser and more distinct punctures of the intervals, and by the form and size of the wings which consist of a slender subopaque cellulo-membranous fillet, without noticeable venation, slightly wider in apical half, about four-fifths as long as the prothorax and less than one-third as long as the elytra. The male is decidedly smaller and, especially, more slender than the female.

Pulverulentus is distinctly smaller than *rufipes* and as these species are both abundant, the differences may be rendered very obvious if the large series possessed by almost every cabinet of note be properly separated.

28 **B. parallelus** n. sp.—Elongate-oval, subparallel, strongly convex, rather strongly shining, black; legs piceo-rufous; pubescence fine, moderate in length, sparse, dark piceo-fulvous and very inconspicuous. Head moderately transverse, feebly convex, densely and deeply punctate; upper lobe of eyes small; antennæ rather robust, the last three joints rather abruptly but slightly wider, third joint much shorter than the next two together. Prothorax but slightly more than one-half wider than long, very feebly narrowed from base to apex, the sides evenly and rather strongly arcuate; basal sinuations moderate; basal angles right, not in the least rounded; disk evenly convex, very densely but not very confluent punctate toward the sides, much more sparsely so toward the middle especially near the base; punctures moderate in size. Scutellum ogival, rather finely and densely punctate, with the usual impunctate polished margin. Elytra nearly three times as long as the prothorax, rather shorter in the male, subequal in width throughout to the latter, narrowly, parabolically rounded at apex; disk with rows of very fine punctures, the striæ extremely feebly impressed, more visibly so toward the suture but scarcely toward the sides, the punctures separated by from two to three times their own diameters; intervals flat, finely and very sparsely punctured. Abdomen finely, sparsely punctate, with short sparse inconspicuous pubescence; surface generally more or less longitudinally rugulose. Legs moderate.

Male.—Anterior tarsi very strongly dilated, the second joint much longer than the third; intermediate rather strongly dilated but much less so than the anterior; abdomen broadly, moderately impressed in the middle toward base, the fifth segment with a small transversely-oval and rather strongly impressed apical fovea.

Length 5.0–5.5 mm.; width 2.0–2.2 mm.

California (Mountains of Santa Cruz Co.). Mr. Harford.

This species is closely allied to *pulverulentus*, but differs in several points to such a degree that I can see no other correct course to pursue than to separate it. The form is rather narrower

and more parallel, and the elytral striæ more finely punctured and more feebly impressed. The males and females are of similar form and nearly equal in size, and the wings consist of an exceedingly slender elongate parallel fillet, rather membranous in texture, devoid of distinct venation, more than four times as long as wide, about one-fourth longer than the prothorax and nearly one-half as long as the elytra, with a deep sinuation on the lower edge near the apex. This singular form is constant in the only two specimens dissected.

It will be seen, therefore, that the wings are very different from those of *pulverulentus*, but approach those of *inquisitus*, from which *parallelus* differs in its longer prothorax, finer punctures of the elytral striæ and decidedly greater convexity.

29 **B. inquisitus** n. sp.—Oblong-oval, moderately convex, strongly shining, black above and beneath; legs dark piceo-rufous; pubescence fine, short, very sparse, dark piceo-cinereous and inconspicuous. *Head* moderate, fully one-half wider than long, feebly convex, deeply, not very coarsely, densely punctate, the punctures decidedly sparser along the middle; epistoma moderately sinuate; upper lobe of eyes small, rounded; antennæ somewhat robust, the last three joints rather abruptly but slightly wider, third joint twice as long as the second, the latter shorter than the fifth, three to five uniformly and rapidly decreasing in length, eighth a little wider, as long as wide, eleventh very slightly narrower than the tenth. *Prothorax* one-half wider than long, sides very feebly convergent from base to apex, evenly and rather feebly arcuate; base transverse, the sinuations moderately distinct; basal angles right, not at all rounded; apex broadly, feebly emarginate in circular arc; disk somewhat finely, densely punctate, more sparsely so toward the middle where the punctures are generally separated by one-half more than their own diameters, not coalescent laterally. *Scutellum* moderate, densely, finely punctate, the posterior edge broadly polished and impunctate. *Elytra* subequal in width to the prothorax and about two and one-half times as long; sides very feebly arcuate, parabolically rounded at apex; disk distinctly flattened toward the suture, finely striate, the striæ feebly but rather abruptly impressed, very slightly deeper and more coarsely punctate laterally; stria punctures generally fine and very approximate, usually separated by between once and twice their own diameters; intervals flat, finely and sparsely punctured. *Abdomen* polished, finely, sparsely punctate, the pubescence very sparse, rather short, fine, dark fulvo-cinereous and not conspicuous. *Legs* moderately robust.

Male.—Anterior tarsi very strongly dilated, the second joint decidedly longer than the third; intermediate distinctly but not strongly dilated, the second joint a little wider than the first and third; abdomen narrowly and rather strongly impressed in the middle toward base, the punctuation not distinctly denser in the middle of the first segment.

Length 5.0 mm.; width 2.0 mm.

California (Truckee, Nevada Co.).

The three specimens before me indicate a species allied to *pulverulentus*, but quite distinct in its more depressed parallel form, similarity in size and form of the male and female, and more decidedly in the form of the hind wings. The wings are about one-fourth longer than the prothorax and one-half as long as the elytra, consisting of a long parallel very slender fillet, subhyaline in structure, about four times as long as wide, with the two veins very feebly developed, not extending quite to the middle and equally trisecting the width throughout their extent.

30 *B. auripilis* Horn.—Trans. Am. Phil. Soc., XIV, p. 353.—Oblong-oval, very convex; sides parallel; integuments dull, dark brown in color; pubescence moderate in length, recumbent, rather robust and dense, bright golden-yellow and blackish-piceous confusedly intermingled, the two kinds subequal in size and abundance. *Head* moderate, strongly transverse; sides strongly convergent anteriorly from before the eyes, the apex strongly sinuate; surface feebly convex, very densely punctate, the punctures coarse posteriorly, finer anteriorly; interspaces rather shining, convex, very minutely, evenly reticulate; eyes moderate; antennæ rather short and slender, gradually and not very strongly incrassate toward apex, second joint not one-half as long as the third, the latter rather elongate although distinctly shorter than the next two combined. *Prothorax* feebly narrowed from base to apex, three-fourths wider than long; sides slightly more strongly arcuate before the middle; apex broadly emarginate; base transverse, the lateral sinuations broad and distinct; disk very strongly convex, not very coarsely but deeply evenly and very densely punctate throughout, the punctures nearly in mutual contact laterally, but not coalescent; interspaces convex, alutaceous, very minutely, evenly granulato-reticulate. *Scutellum* punctate, alutaceous, strongly granulato-reticulate throughout. *Elytra* but slightly more than one-half longer than wide, equal in width to and nearly three times as long as the prothorax; sides parallel and nearly straight; apex rather obtusely rounded; disk not very finely but feebly and indistinctly striate, the striae very finely feebly and not very approximately punctate, the punctures distant by from three to four times their own diameters toward the suture, not much exceeding in size those of the intervals and not at all distinct; intervals feebly convex, strongly granulato reticulate, rather coarsely and densely punctate. *Ablomen* rather dull, finely, rather densely punctate and somewhat densely covered with rather long, dense, robust, bright yellow hairs which are very conspicuous.

Length 6.2 mm.; width 2.8 mm.

Arizona.

This species is related to *intermixtus* in the dual character of the vestiture of the upper surface, but not otherwise to any extent; it is rather larger and decidedly more convex, with smaller eyes, the

surface, especially of the abdomen, duller, and the punctuation of the elytral striæ and intervals very different. I have only seen the female.

It is interesting to note that the hairs growing from the punctures of the elytral striæ, which are usually extremely minute, here become quite long and distinct; this may possibly be dependent in some way upon the slight difference between these punctures and those of the intervals observable in this species.

31 **B. intermixtus** n. sp.—Oblong-oval, rather depressed, dark reddish-brown throughout, but very feebly shining, somewhat densely clothed with moderately long robust stiff and subrecumbent pubescence, which is pale golden-yellow and dark piceous-brown confusedly intermingled, the pale hairs slightly the longer and broader. *Head* moderate, about one-half wider than long, feebly convex, somewhat coarsely and rather densely punctate, the interspaces completely dull but not definitely sculptured; upper lobe of the eyes large, nearly circular; antennæ rather robust, nearly as long as the head and prothorax, gradually, strongly incrassate toward apex, second joint about one-half as long as the third, three to five uniformly and very rapidly decreasing in length. *Prothorax* about three-fourths wider than long; sides in basal two-thirds parallel, strongly arcuate, thence more strongly convergent and straighter to the rather prominent apical angles; apex broadly emarginate in circular arc; base transverse, the lateral sinuations strong; disk broadly, evenly, moderately convex, somewhat coarsely, deeply, evenly and very densely punctate, the interspaces strongly reticulate and slightly shining toward the middle, absolutely dull laterally. *Scutellum* punctate, the margin broadly impunctate and polished. *Elytra* about three-fourths longer than wide, three times as long as the prothorax and subequal to it in width; sides parallel, very feebly arcuate posteriorly; disk not very finely striate, the striæ somewhat abruptly but moderately impressed, rather finely and closely punctate, the punctures separated by scarcely more than their own diameters throughout the width, the striæ more strongly impressed externally; intervals flat, not densely, very minutely punctate, slightly shining. *Abdomen* strongly shining, finely, evenly and not very sparsely punctate; pubescence fine, moderate in length, not dense but pale fulvous-yellow and quite distinct. *Legs* moderate.

Male.—Anterior tarsi very feebly dilated, the middle slightly robust; both coarsely, rather sparsely squamulose beneath; abdomen slightly and narrowly flattened in the middle toward base.

Length 5.0–6.0 mm.; width 2.0–2.6 mm.

Arizona (Winslow). Mr. Wickham.

The anterior tarsi of the female are robust or subdilated, not differing appreciably from the male, but are devoid of squamules beneath; in both sexes all the tarsi are clothed with very short

robust recumbent spinulose setæ. The hind wings are well developed, being fully as long as the elytra.

This is a very distinct species in vestiture and was taken in considerable abundance.

32 **B. brevicollis** Lec.—Ann. Lyc. Nat. Hist. N. Y., V, 1851, p. 147.—Oblong-oval, rather robust, moderately convex, blackish-castaneous, rather dull and alutaceous; pubescence moderate in length, fine, recumbent, not dense, dark piceo-fulvous in color and not at all conspicuous. *Head* rather small, about one-half as wide as the prothorax, feebly convex, very densely and deeply punctate throughout, the interspaces much narrower than the punctures and very minutely granulato-reticulate; epistoma large, slightly paler in color, broadly sinuate at apex, the suture well-marked laterally but obsolete in the middle; eyes well-developed, the upper lobe rounded or feebly subtriangular, surrounded by a rather deep and distinct impressed groove; antennæ rather slender, gradually incrassate toward apex, second joint rather longer than wide, third slightly shorter than the next two, fourth distinctly longer than the fifth. *Prothorax* very nearly twice as wide as long; sides rather strongly convergent from base to apex, very evenly and distinctly arcuate; base transverse, the lateral sinuations broad and very distinct, the median lobe slightly more posteriorly prominent than the angles; apex broadly emarginate in circular arc; disk very densely and deeply punctate, the punctures rather small and slightly elongate, the pubescence exceedingly indistinct. Scutellum unusually small. *Elytra* about two-thirds longer than wide and three times as long as the prothorax, subequal in width to the latter, the sides parallel and scarcely perceptibly arcuate in basal two-thirds; disk with very fine feebly impressed striæ, which are very finely and feebly punctate toward the suture, but more coarsely and deeply so externally, the punctures separated by from one-half more than to twice their own diameters; intervals nearly flat toward the suture, six or seven times as wide as the striæ, even, finely, strongly granulato-reticulate, minutely and rather densely punctate. *Abdomen* shining, finely and rather densely punctate, the pubescence fine and not at all conspicuous, shorter toward the middle. *Legs* rather slender, dark rufo-ferruginous.

Male.—Anterior tarsi not in the least dilated; abdomen toward base rather narrowly and extremely feebly impressed.

Length 5.3–6.0 mm.; width 2.6–2.8 mm.

California; Washington State.

The sexual characters in this distinct species are more nearly obsolete than in any other which I have seen. It may be readily known by its dark blackish-rufous color, fine sculpture, inconspicuous pubescence and broad, somewhat depressed form. The sides of the pronotum are narrowly and very obsoletely subexplanate, this character being more obvious in some specimens than others, occa-

sionally disappearing completely; the elytral striæ are also more deeply impressed in some instances.

33 **B. brunneus** n. sp.—Oblong-elongate, rather strongly, subcylindrically convex, pale reddish-brown in color throughout; integuments rather shining, subalutaceous; pubescence rather short and stiff, subrecumbent, uniform, rather abundant, pale yellowish-cinereous and conspicuous. *Head* transverse, rather broadly truncate, the truncation rather wider than the distance between the eyes and broadly sinuate; surface feebly convex, rather coarsely, densely and confusedly punctate, the interspaces very narrow, shining; upper lobes of the eye large and very well developed, separated by scarcely more than four times their own width; antennæ rather long, distinctly clavate, second joint a little longer than wide, fully one-half as long as the third, the latter distinctly shorter than the next two. *Prothorax* rather long, scarcely more than one-half wider than long; sides very feebly convergent from base to apex, very feebly arcuate, becoming nearly parallel in basal two-thirds; apex rather strongly emarginate in circular arc; base transverse; lateral sinuations rather feeble but distinct; disk somewhat coarsely, deeply and very densely punctate, the punctures not coarser and, although extremely dense and nearly in mutual contact laterally, having scarcely any tendency to longitudinal coalescence, a very little sparser toward the middle where they are slightly uneven in distribution, but generally separated by less than their own diameters. Scutellum small, transverse, finely, rather densely punctate. *Elytra* parallel, equal in width to the prothorax and about three times as long, finely striate, the striæ feebly impressed and rather finely but deeply and approximately punctate, the punctures generally separated by their own diameters or less; intervals flat, minutely, strongly reticulate, very finely, not densely punctate. *Abdomen* strongly shining, finely, not very densely punctate; pubescence moderate in length, fine, not dense, pale and distinct. Hind wings long and well developed.

Length 5.7 mm.; width 2.4 mm.

Texas.

This is a very distinct species in its elongate subcylindrical, although but moderately convex form and pale coloration. It differs from *hesperius* in its much shorter pubescence, longer prothorax, much more shining and more sparsely punctate abdomen and very much larger eyes. From *intermixtus*, with which it may also be confused, it differs in its less transverse prothorax, more shining integuments, and finer and feebler elytral striæ, as well as in the uniform pubescence.

Although represented by the female only, I have placed the present species as well as *hesperius* and *auripilis* in the group with feebly dilated anterior male tarsi, because of their analogy to *intermixtus* in general habitus.

34 **B. hesperius** n. sp.—Oblong-oval, moderately convex, smooth, rather shining, reddish-brown in color; pubescence rather long and robust, sub-recumbent, pale yellowish-cinereous throughout and distinct, although not very dense. *Head* transversely oval, feebly convex, rather coarsely, deeply, moderately densely punctate; epistoma distinctly sinuate; upper lobe of the eyes moderately large, slightly oblique and oval; antennæ rather short, outer joints not very large, second subquadrate, not quite one half as long as the third, the latter slender, very slightly shorter than the next two combined. *Prothorax* about two-thirds wider than long, widest slightly behind the middle, the sides being distinctly convergent from base to apex, evenly and rather strongly arcuate throughout; apex evenly, distinctly emarginate in circular arc; base transverse, the lateral sinuations strong; disk rather coarsely, deeply and very densely punctate, the punctures longitudinally subconfluent toward the sides, slightly smaller and rather unevenly distributed, although generally almost in mutual contact, toward the middle. Scutellum finely punctate, reticulate throughout. *Elytra* nearly parallel, but just visibly wider than the prothorax and nearly three times as long; sides very feebly arcuate; disk with series of rather small, circular, rather deep and subperforate punctures which are in general distant by about their own widths, the striæ extremely feebly impressed, rather more distinctly so laterally; intervals nearly flat, extremely minutely but distinctly and rather sparsely punctate, the surface rather shining, minutely creased and somewhat coarsely granulato-reticulate. *Abdomen* rather shining, minutely, distinctly granulato-reticulate, finely and somewhat densely punctate, the pubescence rather long, moderately dense, bright yellowish-cinereous and distinct. Tarsi slender.

Length 4.7 mm.; width 1.9 mm.

Oregon.

The single specimen serving as the type of the above diagnosis is a female, and indicates a species somewhat resembling *intermixtus* in general habitus, but differing in its smaller size, rather more slender form, longer and uniform pubescence, more shining surface, feebler, finer elytral striæ and slightly smaller eyes.

35 **B. vestitus** Lec.—Col. of Kans., 1859, p. 15.—Elongate-elliptical, very convex, black; integuments rather dull; pubescence rather abundant, moderate in length, very robust and squamiform, arcuate and subrecumbent, pale yellowish-cinereous and conspicuous. *Head* rather small and short, much wider than long and three-fifths as wide as the prothorax, densely, deeply but not very coarsely punctate, slightly scabrous; upper lobe of eyes rather small; epistoma short, broadly sinuate at apex, the suture not visible; antennæ slender toward base, strongly dilated toward apex, second joint slightly longer than wide, third much shorter than the next two, tenth strongly transverse, eleventh slightly narrower, nearly circular, the apical two-fifths spongiose. *Prothorax* rather long, scarcely two-thirds wider than long, the sides distinctly convergent from base to apex, vaguely subangulate just before the middle,

nearly straight and feebly divergent thence to the base, and more strongly convergent to the acute and very slightly prominent apical angles; apex broadly, feebly emarginate; base transverse, broadly and very distinctly sinuate laterally; disk transversely, very strongly convex, rather coarsely, very deeply and extremely densely punctate. Scutellum moderate, punctate. *Elytra* about three times as long as, and very slightly wider than, the prothorax; sides parallel and slightly arcuate; apex rather narrowly rounded; disk with rather fine, very feebly impressed striæ which are finely, feebly and approximately punctate; intervals nearly flat, four or five times as wide as the striæ, finely granulose, rugulose and very minutely, rather densely punctate. *Abdomen* shining, finely and not very densely punctate, uniformly clothed throughout with rather short, fine, recumbent, pale but sparse and inconspicuous pubescence. *Legs* and tarsi rather short and robust.

Male.—Anterior tarsi feebly dilated and squamulose beneath, the intermediate not dilated but with a few squamules beneath; abdomen toward base narrowly and scarcely perceptibly flattened.

Length 4.2–4.9 mm.; width 1.8–2.1 mm.

Kansas; Colorado.

One of the most aberrant species of the genus, easily recognizable by its strongly convex elongate-oval form, feeble elytral striæ and coarse squamiform pale and conspicuous vestiture.

36 ***B. hospes*** n. sp.:—Oval, very convex, somewhat dull, grayish-black; pubescence rather long and abundant, rather coarse, pale cinereous and conspicuous, recumbent. *Head* feebly convex, very densely punctate; upper lobe of eyes moderate; antennæ rather robust, outer joints gradually and rather strongly dilated, third short, scarcely two-thirds longer than the second, much shorter than the next two together, seventh distinctly wider than long. *Prothorax* about three-fourths wider than long, the apex a little narrower than the base; sides almost evenly and very feebly arcuate; base transverse, the sinuations broad and distinct; basal angles right, rather prominent, not at all rounded; apex very feebly emarginate in circular arc; disk somewhat coarsely and very densely punctate, the punctures usually a little sparser toward the middle, and more or less longitudinally coalescent toward the sides but never forming long rugæ. Scutellum small, not very densely punctate. *Elytra* about two and one-half times as long as the prothorax and, behind the middle, just visibly wider, somewhat acutely rounded behind; disk with fine striæ which are excessively feebly impressed and extremely finely, feebly punctured, the punctures generally separated by about twice their own diameters; intervals nearly flat, sparsely and very minutely punctate. *Abdomen* strongly shining, very finely, rather sparsely punctate, the pubescence moderate in length, sparse, cinereous but not very conspicuous. *Legs* short.

Male.—Anterior tarsi rather strongly dilated, the second and third joints equal in length, the latter slightly the wider; intermediate more feebly but distinctly dilated; both pairs densely and rather coarsely spongy-pubescent

beneath; abdomen narrowly and more or less distinctly flattened in the middle toward base, the fifth segment not modified.

Length 3.8–4.4 mm.; width 1.5–2.0 mm.

Wyoming (Cheyenne), Mr. Wickham; Colorado (Garland), Mr. Schwarz.

This form is closely allied to *vestitus*, and in a purely natural sequence of the species the two must be associated together. It differs from *vestitus* in its much longer, finer pubescence and more strongly dilated anterior tarsi of the male, although even here the peculiar structure of the tarsus,—the second joint being distinctly narrower than the third,—is common to them both.

The punctuation of the pronotum varies considerably, and in the female from Garland is finer, not so dense toward the sides and without any marked tendency to coalescence. The punctures of the elytral striæ are finer than in any other species known to me, being decidedly smaller and more feeble than in *vestitus*.

37 **B. pimalis** Casey —Cont. Descr. and Syst. Col. N. A., II, Jan. 1885, p. 185.—Oblong-oval, convex, black; integuments feebly shining; pubescence rather long and fine, subrecumbent, rather dense but dark piceous-brown in color and not at all conspicuous. *Head* moderate, wider than long, two-thirds as wide as the prothorax, deeply and very densely but not coarsely punctate, the basal portion of the occiput abruptly very minutely punctato-scabrous; upper lobe of eyes moderate, slightly oval; antennæ moderate, rather slender, the last three joints wider, parallel, forming a loose club, third joint much shorter than the next two. *Prothorax* about one-half wider than long; sides feebly convergent from base to apex, distinctly and almost evenly arcuate; apex broadly, feebly emarginate; base transverse, broadly and feebly but distinctly sinuate laterally; basal angles slightly rounded; disk rather finely, very deeply and densely punctate throughout. *Scutellum* small, punctate. *Elytra* about two-thirds longer than wide, fully two and one-half times longer and very slightly wider than the prothorax; sides parallel and distinctly arcuate, straighter toward base; disk with fine, feebly impressed striæ of small, rather feeble but distinct punctures, the punctures generally separated by nearly twice their own diameters; intervals very feebly convex, about five times as wide as the striæ, finely and confusedly granulato-rugulose, minutely and not densely punctate. *Abdomen* shining, finely and sparsely punctate, the pubescence fine, sparse, pale fulvous and not at all conspicuous. *Legs* and tarsi moderate.

Male.—Anterior tarsi very feebly but distinctly dilated, squamulose beneath, the intermediate not dilated but with small rounded patches of squamules; abdomen narrowly and very feebly impressed toward base, the basal segment abruptly very densely punctate in the middle.

Length 4.6–5.1 mm.; width 1.8–2.2 mm.

Arizona—Mr. Morrison.

This species somewhat resembles *rufipes* in its dull, densely and finely punctate integuments and dark pubescence, but differs in its shorter form and smaller size, and, more radically, in the very feeble dilatation of the male tarsi and more rudimentary hind wings, the latter in the present species consisting of a slender cellulo-membranous plate, about three and one-half times as long as wide, and about as long as the prothorax.

The *umbrosus* of Champion (Biol. Cent.-Amer. Col., IV, i, Oct. 1885, p. 127) is possibly the same as *pimalis*, although the length given for *umbrosus* is substantially greater than in any of the seven representatives of *pimalis* which I have before me, and the punctures of the elytral striæ in the latter do not exhibit the slightest trace of transversality.

38 **B. arenarius** n. sp.—Elongate-oval, strongly convex, black, strongly shining; pubescence fine, rather short and sparse, fulvous in color and very inconspicuous. *Head* moderate, wider than long, slightly convex, deeply and somewhat coarsely perforato-punctate, the punctures dense laterally, sparser along the middle, abruptly much finer on the occiput and slightly sparser anteriorly; epistoma broadly, feebly sinuate, the suture completely obsolete laterally; upper lobe of eyes rather well developed, oval; antennæ slender, the last three joints robust, second joint a little longer than wide and two-thirds as long as the third, the latter but one-fourth longer than the fourth, three to five decreasing uniformly in length. *Prothorax* somewhat elongate, not quite one-half wider than long and two-thirds wider than the head; sides feebly convergent from base to apex, evenly and rather strongly arcuate; apex broadly, feebly emarginate in circular arc; base transverse, the lateral sinuations moderate in width and strongly marked; disk very finely and rather sparsely punctate toward the middle where the punctures are separated by two or three times their own diameters, rapidly larger, deeper and much denser in lateral fourth but not coalescent to any great extent; interspaces flat, polished, minutely reticulate. *Scutellum* small, minutely, rather sparsely punctate. *Elytra* fully two-thirds longer than wide, two and one-half times as long as the prothorax and, near the middle, very slightly wider than the latter; sides parallel and distinctly arcuate; apex somewhat narrowly rounded; disk with very feebly impressed striæ, which become very fine toward the suture and much coarser externally, the striæ with deep, circular, perforate punctures, very fine internally, much coarser externally, generally separated by about twice their own diameters; intervals nearly flat toward the suture, distinctly convex laterally, finely, not densely punctate, coarsely reticulate, minutely feebly creased, polished. *Abdomen* shining, very finely, sparsely punctate; pubescence fine, short, recumbent, sparse and inconspicuous. *Legs* piceous, shining, rather robust.

Male.—Anterior tarsi feebly but distinctly dilated, finely, densely spongy-pubescent beneath; intermediate just visibly dilated, spongy-pubescent like the anterior; abdomen narrowly and feebly impressed, the basal segment not abruptly more densely punctate in the middle.

Length 4.3–5.0 mm.; width 1.8–2.1 mm.

Texas (Galveston).

A rather small species, resembling *mæstus* and *pulverulentus*, differing from both in the much more feebly dilated male tarsi, and from *mæstus*, in addition, in the development of the wings. In *arenarius* the hind wings are extremely rudimentary, consisting of a slender parallel fillet of semi-opaque cellular membrane, which is but slightly more than one-half as long as the pronotum.

39 ***B. debilis*** n. sp.—Narrow, moderately convex, very slightly cuneate in the male, black, rather strongly shining; pubescence fine, moderate in length, recumbent, rather sparse but cinereous and distinct. *Head* moderate, transverse, feebly convex, rather finely, evenly and sparsely punctate throughout, the punctures a little elongate and separated by nearly twice their own widths; upper lobe of eyes rather large and nearly circular; antennæ slender, rather short, club feeble, second joint longer than wide, equal to the sixth and shorter than the fifth, third subequal to the fourth, the fifth a little shorter. *Prothorax* two-thirds wider than long, widest before the middle where the sides are feebly and roundly subangulate, thence very feebly convergent and nearly straight to the base and more strongly convergent and slightly arcuate to the apex, which is broadly, distinctly emarginate in circular arc; base transverse, the lateral sinuations moderately distinct; disk evenly, rather feebly convex, finely and rather sparsely punctate, the punctures separated by nearly three times their own widths except toward the sides, where they are distant by about twice their diameters; interspaces minutely and feebly reticulate. *Scutellum* small, feebly punctate. *Elytra* nearly twice as long as wide and almost three times as long as the prothorax, scarcely as wide as the latter, gradually narrowed behind from before the middle, the apex rather acute, finely striate, the striæ very feebly impressed, the punctures very distant in the median striæ, where they are separated by from four to six times their own diameters, but closer in the striæ toward the suture; intervals nearly flat, minutely and sparsely punctate, finely, rather strongly reticulate and feebly undulated. *Abdomen* polished, very finely, sparsely punctate, minutely, finely and very sparsely pubescent. *Legs* moderate, rufo-piceous.

Male.—Anterior tarsi feebly but distinctly dilated, finely, densely spongy-pubescent beneath; intermediate but slightly less dilated than the anterior, similarly clothed; abdomen almost absolutely without trace of impression or flattening toward base.

Length 3.6 mm.; width 1.3 mm.

Texas (Dallas).

This very small species is decidedly aberrant not only in facies

but in its unusually short third and long fourth antennal joints, these being virtually equal, and in the absence of any decided sexual modification of the basal portions of the abdomen, although the impression of the fifth segment is well developed. The description is taken as usual from the male, the female being parallel.

40 **B. humilis** n. sp.—Oblong-elongate, slender, parallel, moderately convex, black, feebly alutaceous; pubescence extremely short and excessively sparse, stiff, cinereous and completely inconspicuous. *Head* rather large, transverse, feebly convex, somewhat sparsely and unevenly punctate, the punctures moderate in size and decidedly denser anteriorly; epistoma rather deeply sinuate in the middle; upper lobe of eyes large and well developed, nearly circular; antennæ moderate, gradually, strongly incrassate, second joint as long as wide, subequal to the fifth, fully two-thirds as long as the third, three to five decreasing rather rapidly in length. *Prothorax* about two-thirds wider than the head and nearly two-thirds wider than long; sides very feebly convergent from base to apex, very feebly subangulate before the middle, the sides thence nearly straight to base and apex, the latter broadly, feebly emarginate in circular arc; base transverse, lateral sinuations distinct; disk transversely, evenly and very moderately convex, finely and rather sparsely punctate toward the middle where the punctures are separated by about twice their own diameters, thence gradually coarser and denser laterally but not coalescent; interspaces finely granulato-reticulate. *Scutellum* well developed. *Elytra* long, fully four-fifths longer than wide, scarcely visibly wider and two and one-half times longer than the prothorax; sides parallel and just visibly arcuate; disk with narrow but rather deeply and abruptly impressed striae, which are very finely and deeply punctate, more coarsely so laterally, the punctures generally separated by two or three times their own diameters; intervals nearly flat, minutely, sparsely punctate, feebly undulated. *Abdomen* very finely and sparsely punctate, longitudinally rugulose toward base, polished, the pubescence exceedingly short, recumbent, cinereous and scarcely at all noticeable. *Legs* moderate, piceous.

Male.—Anterior tarsi feebly but distinctly dilated, spongy-pubescent beneath; intermediate just visibly dilated, narrowly and not very densely spongy-pubescent beneath; abdomen narrowly and very feebly impressed in the middle toward base, the first segment not more densely punctate in the middle.

Length 4.0 mm.; width 1.7–1.8 mm.

Florida (Key West). Mr. W. Jülich.

One of the smallest species of the genus, comparatively isolated in its narrow form and extremely short inconspicuous pubescence. I have seen three specimens.

41 **B. pubescens** Leoc.—Ann. Lyc. Nat. Hist. N. Y., V, p. 147; *lecontei* Muls.: Ann. Soc. Agr. Lyon, 1859, p. 192.—Oblong-oval, convex, black;

integuments shining; pubescence rather dense, robust but not at all squamiform, moderate in length, recumbent, pale cinereous-white and very conspicuous. *Head* moderate, wider than long; sides convergent in front, the apex broadly sinuate, the angles broadly rounded; sides before the eyes broadly rounded, not prominent; surface feebly convex, densely, rather coarsely and deeply punctate, the punctures rather elongate, becoming abruptly much smaller and sparser on the epistoma, the interspaces narrower than the punctures, finely, feebly granulose, wider and more polished on the epistoma; upper lobe of the eyes rather well developed, slightly longer than wide; antennæ somewhat slender, a little shorter than the head and prothorax, outer joints gradually more robust, second small, subglobular, third long, slender, fully as long as the next two, tenth but slightly shorter than the ninth, two-fifths wider than long, the eleventh rather longer than wide, narrowed and spongiose in apical half, very obtusely rounded at apex and but just visibly narrower than the tenth. *Prothorax* two-thirds wider than the head and nearly two-thirds wider than long, widest at basal third; sides very feebly convergent from base to apex, evenly and strongly arcuate; base transverse, the lateral sinuations broad and extremely feeble; apex broadly, very feebly sinuate, the angles slightly obtuse, not at all rounded and not prominent; disk transversely convex, very densely, evenly punctate, the punctures moderate in size, slightly elongate, the interspaces very narrow, flat, finely reticulato-granulose. Scutellum densely punctate. *Elytra* about three-fourths longer than wide, two and one-half times as long as the prothorax and, just behind the middle, very slightly wider, having very even, feebly impressed rows of round, deeply impressed punctures, separated by less than their own diameters and rather coarse, the intervals nearly flat, about three times as wide as the striæ, finely, rather densely punctate and minutely reticulate. *Abdomen* rather finely and sparsely punctate, finely and sparsely pubescent. *Legs* piceous-black.

Male —Anterior tarsi not noticeably dilated; abdomen broadly, feebly impressed in the middle through the basal half.

Length 5.0–6.0 mm.; width 2.3 mm.

California (San Bernardino and San Diego).

The description is taken from the male, the female being a little more elongate, with the elytra slightly longer. It is a very well-marked species, forming an easy transition from the ordinary types of the genus to *sulcatus* and *hydropicus*, possessing the elongate third antennal joint of the latter, with the normal structure of the head. The punctures of the elytra have nearly the same coarse perforate appearance as in *sulcatus*, but are scarcely more than one-half as large, the striæ being much more feebly impressed and the intervals much wider.

42 *B. sulcatus* Lec.—Ann. Lyc. Nat. Hist. N. Y., V, p. 147.—Moderately robust, convex, oblong-oval; integuments dull black, the pubescence in the

form of robust, arcuate, subrecumbent, scale-like hairs, rather dense, pale yellowish-cinereous and very conspicuous. *Head* slightly wider than long, subhexagonal, the sides before the eyes prominent and angulate; epistoma very broadly truncate, the truncation sinuate in the middle, the anterior angles rather narrowly rounded; surface very feebly convex, rather coarsely, deeply punctate, the punctures polygonally crowded, the acute interspaces granulose; upper lobe of the eyes small, slightly elongate-oval; antennæ robust, rather distinctly shorter than the head and prothorax, gradually, feebly incrassate, second joint very short, the third clavate, longer than the next two together and more than three times as long as the second, tenth transverse, shorter than the ninth and rather wider than the eleventh, the latter ovoidal, as long as wide. *Prothorax* about two-thirds wider than the head and two-thirds wider than long; sides feebly convergent from base to apex and rather strongly arcuate, the disk being widest slightly behind the middle; base broadly, feebly bisinuate; apex truncate between the slightly advanced acute angles; disk transversely, evenly and strongly convex, abruptly and very narrowly explanate along the lateral edges, punctured like the head, the interspaces a little less granulose. Scutellum granulose and dull, rather sparsely, coarsely punctate and squamulose. *Elytra* four-fifths longer than wide, three times as long as, and, just behind the middle, about one-fifth wider than the prothorax, each with nine deeply excavated abrupt closely and deeply punctate grooves, the intervals flat, but very slightly wider than the grooves, granulose, asperately punctate and rather densely clothed with the very robust squamiform hairs, each stria puncture bearing a very minute slender hair from its anterior wall. *Abdomen* shining, rather sparsely, coarsely punctate and finely, sparsely pubescent. Hind wings rather well developed, a little shorter than the elytra.

Male.—Anterior tarsi not perceptibly dilated; abdomen broadly, just visibly impressed in the middle toward base.

Length 5.0–5.8 mm.; width 2.0–2.3 mm.

California; Texas.

A conspicuous species, distinguishable at once by its deeply grooved elytra, pale robust and squamiform pubescence, narrowly subreflexo-explanate sides of the prothorax and polygonal head, with prominent angulate sides. Together with the next it constitutes a group, comparatively isolated not only by these characters, but by the very short second and greatly developed third joint of the antennæ.

43 *B. hydropicus* n. sp.—Very robust, oblong-oval, distinctly wider behind, convex, brownish-black, dull, the pubescence in the form of very short arcuate semierect robust scale-like hairs, which are moderately dense, dark piceous-brown in color and not at all conspicuous. *Head* and antennæ nearly as in *sulcatus*, the former very slightly more transverse, dull, rather coarsely, very deeply punctate, the punctures polygonally crowded. *Prothorax*

about two-thirds wider than the head and five-sixths wider than long; sides feebly convergent from base to apex, strongly and almost evenly arcuate; base broadly, feebly arcuate, feebly sinuate laterally; basal angles acute and a little less posteriorly prominent than the middle; apex truncate between the slightly advanced acute angles; disk widest slightly behind the middle, transversely convex, very abruptly and conspicuously, although somewhat narrowly explanate along the sides, punctured like the head. Scutellum dull, granulose, sparsely punctate. *Elytra* scarcely three-fourths longer than wide, rather inflated behind, three times as long as, and distinctly wider than, the prothorax, having deep abrupt deeply punctate grooves, the punctures of the grooves separated by nearly their own diameters; intervals flat, scabrous, asperately punctate, and distinctly wider than the grooves, the erect scales numerous, unevenly arranged. *Abdomen* finely granulose and but feebly shining, rather coarsely and densely punctate, somewhat densely covered with robust recumbent yellowish-cinereous hairs which are conspicuous.

Male.—Anterior tarsi scarcely perceptibly dilated; abdominal impression broad and nearly flat.

Length 5.1–6.0 mm.; width 2.3–2.7 mm.

Arizona.

Although allied to *sulcatus* this species is very easily separated by its much more robust form, more transverse prothorax, wider elytral intervals, shorter darker¹ more erect and much less conspicuous vestiture of the upper surface and more robust denser and more distinct pubescence of the abdomen, the latter being duller and more densely punctate. The explanate lateral portion of the pronotum is much wider in the present species and almost perfectly flat.

44 **B. discolor** Horn.—Trans. Am. Phil. Soc., XIV, p. 354.

I have not seen the unique type of this species, but from the description it would appear as if it were not correctly placed in *Blapstinus*. Its coloration is absolutely foreign to this genus, although quite common in the apterous genera allied to *Conibius*; its glabrous surface is also a very exceptional character especially among the Californian species of *Blapstinus*. It is probable that *discolor* is apterous, and that it will prove to be a member either of *Conibius* or of an allied genus.

MECYSMUS Horn.

The species of this genus are not very numerous and somewhat resemble the more elongate and depressed forms of *Blapstinus* such

¹ An immersion for three hours in pure ethylic ether does not affect the color of the vestiture, showing that this is not due to any fatty exudation.

as *longulus*, but on closer observation it is readily seen that the antennæ are rather more slender, the base of the prothorax straight, the humeri exposed and the hypomera not impressed near the lateral edges.

The anterior tarsi of the male are moderately dilated and vary considerably in the vestiture of the under surface, thus affording excellent subordinate structural characters for the identification of the species. The wings are well developed, and the flight is probably stronger than in *Blapstinus* on account of the greater lightness of the body.

The species may be divided into two distinct groups as indicated in the following table:—

Anterior tibiæ normal; punctuation of the elytral intervals confused; form strongly depressed.....	I
Anterior and middle tarsi densely spongy-pubescent beneath in the male; form broader; prothorax strongly transverse, the apex more deeply emarginate; punctures of the elytral striæ finer.....	laticollis
Anterior tarsi dilated and spongy-pubescent beneath; intermediate simply spinose beneath.....	angustus
Anterior tarsi scarcely perceptibly dilated, devoid of fine pubescence beneath; intermediate not dilated, coarsely spinose.....	tenuis
Anterior tibiæ distinctly compressed and dilated from base to apex; each elytral interval with a single even series of setigerous punctures; body more convex.....	II
Pubescence extremely short and inconspicuous; pronotal punctuation very sparse throughout; punctures of the intervals very much finer than those of the striæ.....	parvulus
Pubescence longer, denser and much more conspicuous; pronotal punctuation dense toward the sides; punctures of the intervals coarser, not so noticeably smaller than those of the striæ; size larger.....	advena

M. laticollis n. sp.—Oblong-elongate, parallel, depressed, black throughout; legs dark rufous; antennæ testaceous; integuments strongly shining; pubescence rather long and fine, sparse, pale cinereous and distinct. *Head* coarsely, moderately densely punctate, the median line almost impunctate; epistoma extremely feebly, broadly sinuate; upper lobes of eyes rather large; antennæ slender, distinctly incrassate toward tip, third joint slender but shorter than the next two, tenth nearly as long as wide, eleventh very slightly longer than wide and as wide as the tenth. *Prothorax* three-fourths wider than the head and fully two-thirds wider than long; base straight and truncate, equal in width to the apex, the latter strongly emarginate throughout the width in circular arc; basal angles distinctly obtuse but not at all rounded; sides strongly, evenly arcuate; disk widest in the middle, coarsely, very sparsely punctate toward the middle, more densely so but with the punctures

still well separated toward the sides. Scutellum well developed, of the usual structure. *Elytra* parallel, just visibly wider than the prothorax and rather more than three times as long, at base but very slightly wider than the base of the pronotum, the humeri rounded; apex broadly, obtusely rounded; sides very feebly arcuate; disk finely striate, the striae feebly impressed, rather finely punctate, the punctures generally separated by between once and twice their own diameters; intervals flat, rather coarsely, sparsely and irregularly punctured. *Abdomen* coarsely, rather sparsely punctured.

Male.—Anterior tarsi rather strongly dilated, very densely clothed beneath with long dense spongy-pubescence; intermediate very feebly dilated and narrowly but densely pubescent beneath; abdomen broadly, very feebly impressed in the middle toward base.

Length 6.0–6.8 mm.; width 2.2–2.7 mm.

Texas (El Paso). Mr. Dunn.

The largest and most robust species which I have examined, quite distinct from *angustus* in the broad prothorax, strongly emarginate at apex, by the finer stria punctures and coarser punctures of the intervals, as well as in the more strongly developed tarsal characters of the male.

M. angustus Lec.—*Blapstinus ang.*: Ann. Lyc. N. Y., V, 1851, p. 147.—Slender, depressed, subparallel, piceous-black throughout, shining; legs rufopiceous; pubescence moderate in length, fine, sparse but pale cinereous and distinct. *Head* a little wider than long, feebly convex, broadly trapezoidal before the eyes, coarsely and not very densely punctate; epistoma broadly sinuate; upper lobes of eyes moderate, ovate; antennae slender, fully as long as the head and prothorax, very feebly incrassate toward tip, third joint slender, nearly as long as the next two, tenth nearly as long as wide, the eleventh a little longer than wide and but just perceptibly narrower than the tenth. *Prothorax* less than one-half wider than the head and about one-third wider than long; base and apex equal in width, the former truncate and just visibly arcuate, the apex more strongly and very broadly sinuate; basal angles obtuse, not in the least rounded; sides strongly arcuate; disk widest at the middle, coarsely and deeply punctate, the punctures rather sparse toward the middle, denser laterally but not contiguous. Scutellum triangular, densely punctate, with a wide polished impunctate margin. *Elytra* parallel, nearly one-fourth wider than the prothorax and three times as long; sides feebly arcuate; apex rather obtusely rounded; humeri rounded, not covered by the prothorax, the base of the latter distinctly narrower than that of the elytra; disk coarsely striate, the striae rather feebly impressed and coarsely punctate, the punctures round, deeply perforate, well separated; intervals three to four times as wide as the stria punctures, flat or very feebly convex, finely, very sparsely and irregularly punctured. *Abdomen* coarsely, sparsely punctate. *Legs* rather long, the fourth joint of the posterior tarsi fully as long as the first three together.

Male.—Anterior tarsi rather feebly but distinctly dilated and somewhat densely clothed beneath with coarse spongy-pubescent; intermediate robust but not appreciably dilated, simply coarsely spinose beneath without trace of pubescence; abdomen feebly and rather narrowly impressed in the middle toward base.

Length 5.5–5.8 mm.; width 1.9–2.1 mm.

Southern California; Arizona (Yuma).

The female does not differ greatly from the male. I have before me a male example which is entirely rufo-ferruginous in color and rather more robust, in which the anterior tarsi are scarcely perceptibly dilated and clothed beneath with long coarse spines without trace of squamules; the abdomen being broadly and feebly impressed in the middle toward base, shows that there can be no mistake regarding the sex of this specimen, which represents therefore a closely allied species which should not be named at present, for without additional specimens I am unable to state whether or not the peculiar pale color is due to immaturity.

M. tenuis n. sp.—Slender, parallel, depressed, piceous-black; head and prothorax very slightly paler, rufo-piceous; integuments shining; pubescence nearly as in *angustus*. *Head* feebly transverse, slightly convex, rather finely and sparsely punctate; epistoma broadly and very feebly sinuate; upper lobes of eyes moderate, rather convex; antennæ slender, feebly incrassate toward tip, fully as long as the head and prothorax, third joint slender but very distinctly shorter than the next two combined, tenth as wide as long. *Prothorax* scarcely more than one-third wider than the head, one-third wider than long; base distinctly narrower than the apex, the former transversely truncate, the latter nearly so, being but just perceptibly incurvate; basal angles obtuse, not rounded; sides moderately strongly arcuate; disk widest slightly before the middle, rather finely and very sparsely punctate, the punctures toward the sides separated by fully twice their own widths. Scutellum well developed, nearly as in *angustus*. *Elytra* parallel, very slightly wider than the prothorax and about three times as long, at base wider than the base of the pronotum, evenly rounded at apex; humeri rounded; sides slightly and evenly arcuate; disk coarsely but feebly striate, the striæ coarsely, deeply and not very approximately punctured; intervals nearly flat, from three to four times as wide as the stria punctures, very finely, sparsely and irregularly punctate. *Abdomen* coarsely, not very sparsely punctate.

Male.—Anterior tarsi very feebly dilated, spinose beneath, without trace of pubescence; intermediate not dilated; abdomen broadly, very distinctly impressed in the middle toward base.

Length 4.8 mm.; width 1.6–1.8 mm.

Southern California.

This species is allied to *angustus*, but differs in its smaller size,

still more slender depressed form, in the shape of the prothorax, in coloration and still more decidedly in the male sexual characters.

M. parvulus n. sp.—Oblong-elongate, parallel, moderately depressed, highly polished, black; legs and antennæ dark rufous; pubescence very short, robust and setiform, extremely sparse, arranged in single lines on the intervals, silvery-cinereous but not conspicuous. *Head* transverse, feebly convex, finely and sparsely punctate; epistoma narrowly and distinctly sinuate; upper lobes of eye small; antennæ slender, very feebly incrassate, rather short, distinctly shorter than the head and prothorax, third joint slightly longer than the fourth, tenth distinctly wider than long, the eleventh much longer than wide, as wide as the tenth. *Prothorax* about one-half wider than the head and one-half wider than long; base and apex equal in width, the former transversely truncate, the latter broadly, distinctly emarginate in circular arc; basal angles slightly obtuse, not at all rounded; sides rather strongly arcuate; disk widest at about the middle, very sparsely and rather finely punctured, a little less sparsely so toward the sides. Scutellum densely punctate, with a very wide impunctate border. *Elytra* equal in width to the prothorax and nearly three times as long; sides very feebly arcuate; base but very slightly wider than that of the pronotum, the humeri very narrowly exposed; disk with moderately coarse and impressed striæ which are finely and rather distantly punctured; intervals nearly flat, each with a single very regular line of fine, widely distant, setigerous punctures. *Abdomen* finely, very sparsely punctured.

Male.—Anterior tarsi moderately but very distinctly dilated, the subbasal joints very short and transverse, densely spongy-pubescent beneath, the third much wider than the second; intermediate very feebly dilated, narrowly squamulose beneath; abdomen not appreciably modified, evenly convex toward base.

Length 3.7–3.9 mm.; width 1.4–1.5 mm.

New Mexico (Fort Wingate). Dr. Shufeldt.

This very peculiar little species may be readily distinguished from the next, which belongs to the same aberrant group, by its smaller size, finer and sparser punctuation and more indistinct pubescence.

M. advena n. sp.—Oblong, moderately depressed, strongly shining, black throughout; legs dark piceo rufous; antennæ testaceous; pubescence moderate in length, pale, rather dense and distinct on the pronotum, arranged in very even series on the elytra. *Head* rather strongly transverse, rather coarsely and densely punctate; epistoma broadly and feebly sinuate; upper lobes of eyes moderate, nearly as broad as long; antennæ slender, feebly incrassate toward apex, a little shorter than the head and prothorax, third joint much shorter than the next two combined, tenth a little wider than long, eleventh slightly longer than wide. *Prothorax* rather transverse, two-thirds

wider than the head and about two-thirds wider than long; base and apex equal, the former transversely truncate, the latter feebly incurvate in circular arc; basal angles slightly obtuse, not rounded; sides evenly and rather feebly arcuate; disk widest in the middle, somewhat coarsely, deeply punctate, the punctures rather sparse toward the middle, dense but distinctly separated toward the sides. Scutellum triangular, densely punctate, the border rather narrow, impunctate. *Elytra* about equal in width to the prothorax and three times as long in the female, somewhat shorter in the male, rather strongly rounded at apex; sides parallel, very feebly arcuate; base scarcely perceptibly wider than the base of the prothorax; disk with rows of rather coarse, deeply perforate punctures, the striae excessively feebly impressed, the punctures generally separated by nearly twice their own diameters; intervals from three to four times as wide as the striae punctures, flat, each with a single even row of rather coarse punctures which are not more distant than those of the striae. *Abdomen* rather finely, sparsely punctured. *Legs* moderate; fourth joint of the posterior tarsi about equal in length to the first three.

Male.—Anterior tarsi moderately dilated, densely spongy-pubescent beneath, the third joint distinctly wider than the second; intermediate very feebly dilated, similarly clothed; abdomen narrowly and scarcely perceptibly flattened in the middle toward base.

Length 4.1–4.8 mm.; width 1.4–1.8 mm.

Texas (El Paso). Mr. Dunn.

Apparently abundant, and, although allied to *parvulus*, easily distinguishable from that species, in addition to the characters heretofore noted, by the punctuation of the sutural interval which in *advena* is generally confused; in *parvulus* there is a very regular single row of punctures similar to those of the other intervals.

CONIBIUS Lec.

This genus is quite composite, and as here considered, embraces five distinct typical forms, represented by *seriatus*, *opacus*, *sulcatus*, *gagates* and *granulatus*, but as far as structural characters of value are concerned, the groups may be limited to three. These groups agree among themselves in all the characters before given in the table of genera, but might possibly be considered of subgeneric value; at any rate, the difference in general habitus is quite remarkable. As far as variety of type is concerned, *Conibius* may be considered the *Asida* of the *Blapstini*.

The sexual characters are generally very slight, the tarsi being absolutely undilated in the male, but in a few species the anterior tibiae are modified in that sex as described below. As a curious coincidence, it should be mentioned that similar tibial modifications

are described by Champion as affecting some of the Central American species of *Blapstinus*, such as *tibialis* and *grandis*; I have not observed this character in any of our species however.

The several groups and their component species may be readily distinguished by the following table:—

Basal angles of the prothorax obtuse, not distinctly prominent posteriorly; elytral punctures never asperate.

Anterior angles of the prothorax obtuse, not prominent **I**

Elytra not deeply sulcate.

Surface shining; elytra but slightly wider than the prothorax; elytral striæ very feebly impressed, the intervals flat; third antennal joint shorter than the next two combined.

Humeral angles dentiform and feebly everted.

Form slender, parallel..... **parallelus**

Form more robust and convex.

Bicolored; pronotum very minutely and sparsely punctate toward the middle **seriatus**

Unicolorous, much larger; pronotum more coarsely and much more densely punctured toward the middle.

guadalupensis

Humeral angles broadly rounded..... **uniformis**

Surface dull; elytra very much wider than the prothorax, elliptical; striæ distinctly impressed; intervals feebly convex; third antennal joint fully as long as the next two combined..... **opacus**

Elytra deeply sulcate.

Elytra at base narrower than the base of the prothorax; intervals equal in elevation **sulcatus**

Elytral base equal in width to that of the prothorax; alternate intervals much wider and very much more elevated..... **alternatus**

Anterior angles of the prothorax acute and anteriorly prominent; elytral punctures very minute..... **II**

Surface smooth although very dull and alutaceous; elytra with but faint traces of punctured striæ..... **gagates**

Basal angles of the prothorax acute and distinctly produced posteriorly; punctures of the elytral intervals strongly asperate **III**

Slender; elytral intervals rather strongly convex; head about three-fourths as wide as the prothorax **granulatus**

Robust and more depressed; intervals very feebly convex; head scarcely two-thirds as wide as the prothorax **crassipes**

C. parallelus Lec.—Ann. Lyc. N. Y., V, p. 146.—Rather slender, parallel, convex, black; antennæ and legs dark rufo-testaceous; head and pronotum often slightly piceous; lustre and vestiture nearly as in *seriatus*. Head transverse, finely, rather deeply and densely punctate; epistoma very feebly sinuate in the middle of the very wide apex; upper lobe of eye quite

small and rather broadly oval; antennæ very robust and compact, feebly incrassate toward apex, shorter than the head and prothorax combined, third joint not twice as long as wide and a little shorter than the next two, eleventh not distinctly narrower than the tenth. *Prothorax* about one-third wider than the head and one-third wider than long; apex transversely truncate, a little wider than the base, the latter rather distinctly arcuate, the lateral sinuations obsolete; basal angles obtuse but not at all rounded; sides rather feebly arcuate, straight toward base; disk widest before the middle, finely, not very densely punctate toward the middle, the punctures becoming larger, deeper and very dense toward the sides. *Elytra* equal in width to the prothorax and more than twice as long, parallel; sides feebly arcuate; apex rather obtusely rounded; humeri dentiform; disk with excessively feebly impressed striae of very minute punctures which, except toward base, are scarcely larger than those of the intervals, the latter sparse. *Abdomen* finely, feebly and sparsely punctured.

Male.—Without distinct sexual characters.

Length 3.2–4.0 mm.; width 1.1–1.3 mm.

California (San Diego).

This appears to be quite a local species, and I have not seen it from any other locality than that indicated above. It is easily known by its slender parallel form.

In both *parallelus* and *seriatus* the sexual differences are almost completely obsolete, the males, represented by certain slightly less robust specimens, seem however to have the abdomen extremely feebly flattened in the middle toward base. The anterior tibiae and tarsi are not modified in the male; they are short and robust, the latter very compact.

C. seriatus Lec.—Ann. Lye. N. Y., V, p. 146.—Oblong, parallel, rather strongly convex, sublutaceous, dark rufo-testaceous; elytra black; pubescence wanting, replaced by excessively minute, sparse and rather robust, subhyaline setae arising from the punctures. *Head* transverse, minutely and somewhat densely punctate; upper lobes of eyes very small, broadly oval; antennæ robust, incrassate toward apex, a little shorter than the head and prothorax, third joint very short, clavate, about one-half longer than wide, tenth strongly transverse, eleventh a little wider than long and distinctly narrower than the tenth, joints throughout very compactly joined. *Prothorax* about one-third wider than the head and one-half wider than long; apex subtruncate, very slightly wider than the base which is slightly arcuate in the middle, the lateral sinuations just perceptible; basal angles very obtuse and extremely narrowly rounded; sides feebly arcuate, nearly straight toward base; disk widest slightly before the middle, finely punctate, the punctures rather sparse toward the middle, dense but not quite contiguous laterally, not muricate. *Elytra* equal in width to the prothorax and about two and one-half times as long, obtusely rounded behind; sides feebly arcuate; disk with

very fine and feebly impressed striæ of fine, moderately approximate punctures, the intervals sparsely and still more minutely punctured. *Abdomen* sparsely, very minutely and feebly punctate.

Male.—Without distinct sexual modification.

Length 3.8–4.0 mm.; width 1.4–1.6 mm.

California (Humboldt and San Bernardino Cos.).

Easily distinguishable from any other species by its coloration and rather robust form; from *guadalupensis*, which it approaches, it is to be known at once by its coloration, decidedly smaller size and different antennal structure. It is the only species which I have seen which extends its range from the Arizona faunal regions, along the Californian sea-coast to the northern limits of the state.

C. *guadalupensis* n. sp.—Oblong, parallel, rather robust, strongly convex, piceous-black throughout, the legs and antennæ dark rufo-testaceous, rather shining; vestiture as in *seriatus*. *Head* transverse, nearly flat above, deeply and very densely but rather finely punctate, the punctures finer toward the apex; epistoma distinctly sinuate; upper lobe of eye very small; antennæ moderately robust, much shorter than the head and prothorax, rather strongly incrassate toward tip, third joint fully twice as long as wide and but slightly shorter than the next two together, eleventh scarcely visibly narrower than the tenth, the latter one-half wider than long. *Prothorax* two-fifths wider than the head and two-fifths wider than long; base feebly arcuate except near the sides, fully as wide as the apex which is transversely truncate; basal sinuations almost obsolete, the angles obtuse but not distinctly rounded and not in the least produced; sides feebly arcuate, straight toward base; disk widest rather before the middle, rather finely, deeply and very densely punctate throughout, the punctures equal in size although just perceptibly sparser toward the middle, not at all muricate. *Elytra* behind the middle scarcely perceptibly wider than the prothorax and but little more than twice as long; sides rather distinctly arcuate; apex obtusely rounded; disk with feebly impressed rows of very small, feeble and rather closely placed punctures, which become more distinct toward base; intervals minutely and rather sparsely punctate. *Abdomen* polished, very finely and sparsely punctured.

Male.—Without distinct sexual modification.

Length 4.7–5.4 mm.; width 1.8–2.2 mm.

Guadalupe Island.

The ample series of eleven specimens which I have before me, enables me to state with confidence that *guadalupensis* is quite distinct from *seriatus*, with which it has been confounded by Dr. Horn (Trans. Am. Ent. Soc., V, 1876, p. 199). The size is constantly very much greater, and it differs otherwise in its more elongate and more densely and coarsely punctate pronotum, and more

slender antennæ with the third joint longer, as well as by its uniform coloration.

C. uniformis n. sp.—Form oblong-oval, rather robust, convex, black; legs and antennæ piceo-rufous, rather strongly shining; vestiture as in *seriatus*. *Head* strongly transverse, rather coarsely and confluent punctured behind, the punctures becoming very fine and dense anteriorly; epistoma rather strongly sinuate in the middle; upper lobe of eye small, broadly oval; antennæ very robust and compact, nearly as in *seriatus*, but with the third joint a little longer. *Prothorax* moderately transverse, scarcely one-third wider than long; base truncate equal in width to the apex, the latter extremely feebly emarginate; basal angles very slightly obtuse, not at all rounded and slightly produced posteriorly; sides feebly arcuate anteriorly, straight toward base; disk widest before the middle, finely and somewhat sparsely punctate, the punctures becoming much coarser, deeper and very dense toward the sides. *Elytra* distinctly wider than the prothorax and scarcely more than twice as long; sides rather strongly arcuate; humeri obtusely rounded; apex evenly, not very broadly rounded; disk with rather feebly impressed striæ of small but distinct and very closely placed punctures, becoming larger toward base; intervals flat, sparsely and very finely punctured. *Abdomen* polished, finely and sparsely but deeply and distinctly punctate.

Male.—Abdomen narrowly and distinctly impressed in the middle toward base.

Length 3.7–4.5 mm.; width 1.5–1.8 mm.

Arizona.

Although somewhat allied to *seriatus*, this species may be distinguished by its oval elytra, wider than the prothorax, by the much larger and stronger stria punctures, and by the less transverse prothorax with differently formed basal angles.

C. opacus Lec.—*Notibius opac.*: New Spec. Col., 1866, p. 118.—Ovate, strongly convex, black; legs and antennæ piceous; lustre extremely dull because of a fine, strong, granular reticulation; vestiture as in *seriatus*. *Head* transverse, flat, rather finely, very densely punctate, the punctures longitudinally coalescent posteriorly, finer and muricate anteriorly; epistoma very deeply sinuate in the middle; upper lobe of eye small, but larger than usual and broadly oval; antennæ rather long and robust, as long as the head and prothorax, last three joints forming a strong club, third long, fully as long as the next two, tenth nearly twice as wide as long, the eleventh much narrower. *Prothorax* scarcely one-third wider than the head and one-fourth wider than long, the apex broadly emarginate, fully as wide as the base which is just perceptibly and evenly arcuate throughout, the sinuations obsolete; basal angles not rounded, not prolonged posteriorly but rendered very slightly prominent from a very feeble gradual sinuation of the sides before them; sides anteriorly evenly, rather feebly arcuate; disk widest before the middle very

feebly but somewhat broadly reflexed laterally, rather finely, extremely densely punctate throughout, the punctures forming long longitudinal rugæ, less marked and finer toward the middle. *Elytra* oval and subinflated, widest in the middle, at base feebly emarginate and coarctate throughout with the prothorax, two-fifths wider than the latter and more than twice as long, rather acutely rounded at apex; disk very finely but evenly and distinctly striate, the striæ extremely finely punctate, the punctures rather approximate and not larger toward base; intervals nearly flat toward base, strongly evenly convex posteriorly, very minutely and somewhat densely punctate. *Abdomen* shining, very finely, somewhat sparsely punctate. *Legs* long and rather slender.

Male.—Sexual characters not determined.

Length 4.6 mm.; width 2.0 mm.

Lower California (Cape San Lucas). Cab. LeConte.

A very distinct species which could not possibly be confounded with any other, its rather inflated elytra, dull, densely punctate integuments and long antennæ at once distinguishing it; the epipleuræ are relatively very wide, resembling somewhat those of *gagates*. The bases of the prothorax and elytra are exactly equal in width, the humeri not exposed.

The unique type is probably a male, but exhibits no decided sexual modification.

It is highly probable that the Arizona specimens, hitherto referred to this species, have been incorrectly identified.

C. sulcatus Lec.—*Notibius sulc.*: Ann. Lyc. N. Y., V, p. 145.—Oblong-oval, strongly convex, moderately shining, black; legs and antennæ rufous; vestiture as in *seriatus*, but with the setæ still more infinitesimal. *Head* moderately transverse, the sides near the eyes parallel and straight; epistoma broadly, deeply sinuate; surface nearly flat, finely, very densely punctate; upper lobe of eye extremely small and narrow; antennæ robust, rather compact, moderately incrassate toward apex and much shorter than the head and prothorax together, third joint fully as long as the next two, eleventh narrower than the tenth. *Prothorax* about two-thirds wider than the head and nearly one-half wider than long; base rather distinctly wider than the apex, transverse, the lateral sinuations distinct; basal angles nearly right and narrowly rounded; sides very feebly arcuate; apex extremely feebly incurvate; disk widest at about the middle, very feebly explanate near the sides, finely and very densely punctate throughout, the punctures neither muricate nor greatly coalescent. *Elytra* at base distinctly narrower than the base of the prothorax, at the middle a little wider than the disk of the latter, rather more than twice as long; sides evenly and very distinctly arcuate; disk with very coarse, deeply and roundly impressed striæ, which are coarsely, moderately approximately and very feebly punctate; intervals very convex, equal throughout the width, subequal in width to the striæ, minutely and sparsely punctate. *Abdomen* sparsely and minutely punctured. *Legs* rather long.

Male.—Anterior tibiae slender, the anterior surface polished, very finely, sparsely punctate, strongly and obtusely toothed within at one-third the length from the base, the portion thence to the base one-half as wide as the remaining portion.

Length 4.8–5.3 mm.; width 2.0–2.4 mm.

California (San Diego).

The male is more slender than the female. The base of the elytra being distinctly narrower than the base of the prothorax, together with the deeply sulcate elytra and equally convex intervals, will render the identification of this species at all times a very easy matter.

C. alternatus n. sp.—Oblong-oval, very convex, parallel, moderately shining, black; legs dark rufous; vestiture as in *sulcatus*, very brittle and easily removable. Head nearly as in *sulcatus*, but more coarsely and confluent punctate. Prothorax four-fifths wider than the head and two-thirds wider than long; base much wider than the apex, broadly arcuate in the middle, feebly sinuate laterally, the basal angles right, very narrowly rounded and scarcely extending as far posteriorly as the median portion; apex very feebly emarginate; sides evenly and rather strongly arcuate; disk widest in the middle, very feebly explanate posteriorly but not perceptibly so anteriorly, somewhat finely and extremely densely punctate, the punctures tending to coalesce in short irregular rugæ toward the sides, finer and not so coalescent toward the middle. Elytra at base as wide as the base of the prothorax, behind the middle very slightly wider than the disk of the latter and two and one-half times as long; sides feebly but distinctly arcuate; disk with deep, widely impressed sulcations which are somewhat finely and closely but extremely feebly punctured; intervals very convex, alternately narrow, moderate in elevation and as wide as the sulci, and wide and very strongly elevated, very finely and somewhat densely punctured throughout. Abdomen very finely punctate, the punctures sparse laterally, denser toward the middle.

Male.—Unknown.

Length 6.3 mm.; width 2.8 mm.

California.

The unique type is probably a female, as the anterior tibiae are not modified. It is closely allied to *sulcatus*, but may be readily distinguished by the alternately wider, very strongly elevated and more densely punctate intervals, by the decidedly coarser punctures of the head and pronotum, more strongly rounded sides of the latter and relatively narrower apex, by its much smaller head, by the fact that the bases of the elytra and prothorax are equal in width and by its much larger size.

C. gagates Horn.—*Notibius gagat.*: Trans. Am. Phil. Soc., XIV, p. 357.—Robust, oblong, convex, strongly alutaceous, smooth, black; epistoma, legs and antennæ, especially toward tip, paler, dark rufous; vestiture as in *seriatus*. *Head* large, transverse, strongly rounded laterally near the eyes, finely, rather sparsely punctate; epistoma moderately sinuate in the middle; upper lobe of eyes rather small, broadly oval; antennæ robust, moderately incrassate, compact, scarcely as long as the pronotum, third joint short not twice as long as wide and much shorter than the next two, tenth nearly twice as wide as long, the eleventh distinctly narrower. *Prothorax* less than one-half wider than the head and two-fifths wider than long; apex much wider than the base, truncate, slightly oblique and straight at the sides, the apical angles being distinctly prominent and produced anteriorly, slightly acute and not at all rounded; base very feebly arcuate throughout, the sinuations rudimentary; basal angles very obtuse and narrowly rounded; sides evenly and moderately arcuate throughout; disk broadly, feebly explanate at the sides, finely, densely punctate, the punctures slightly finer and sparser toward the middle, not in mutual contact laterally. *Elytra* a little wider than the prothorax and about twice as long; sides feebly, evenly arcuate; humeri broadly rounded; disk rather sparsely and extremely finely punctate, with excessively fine and feebly defined rows of nearly similar punctures, which are generally just perceptibly impressed as seen under certain angles of illumination. *Abdomen* polished, very finely, sparsely punctate. *Epipleuræ* broad. *Hypomera* broadly explanate. *Legs* moderate in length, very robust throughout.

Male.—Anterior tibiæ probably not modified.

Length 5.8 mm.; width 2.9 mm.

Arizona.

This species is quite aberrant, not only in the structure of the prothorax, but in elytral punctuation; the latter is, however, only an extreme form of that existing in *seriatus*. It is not as strongly convex as most of the others.

C. granulatus Lec.—*Notibius gran.*: Ann. Lyc. N. Y. V, p. 145.—Rather slender, parallel, moderately convex, somewhat dull, the elytra more shining, piceous-black, the elytra black; legs and antennæ rufous; vestiture as in *seriatus*. *Head* feebly transverse, very slightly convex, the edges slightly reflexed above the antennæ; sides very feebly emarginate at the epistomal suture; epistoma moderately sinuate in the middle; surface dull, rather finely, very densely punctate, the punctures confused posteriorly, more isolated, smaller and granuliform anteriorly; upper lobe of eyes small, broadly oval; antennæ not very robust, the last three joints abruptly wider, slightly shorter than the head and prothorax, third joint long, fully equal to the next two together. *Prothorax* about one-third wider than the head and one-third wider than long; apex very feebly incurvate, the angles distinctly rounded; base equal to the apex, very broadly, feebly arcuate, the basal angles very acute and prolonged posteriorly much beyond the median portions; sides rather strongly arcuate anteriorly, straight and convergent thence to the base;

disk widest at anterior third, finely and very densely punctate throughout, the punctures shallow and slightly scabrous but not coalescent. *Elytra* a little wider than the prothorax and more than twice as long; sides feebly arcuate; humeri rounded; base transverse; disk finely striate, the striæ broadly and strongly impressed, very finely, moderately closely punctate; intervals broadly convex, each with a single series of fine, closely placed, asperate punctures, arranged unevenly in the series and generally occupying only the median portions of the interval. *Abdomen* coarsely and densely punctate, more finely so toward apex. *Legs* moderate.

Male.—Anterior tibiae very slender, strongly, inwardly bent at the apex and obtusely swollen internally just before attaining the middle; abdomen feebly flattened in the middle toward base, the fifth segment with a strong, transverse, parallel-sided impression.

Length 4.3–4.8 mm.; width 1.6–1.8 mm.

California (southern); Arizona.

This species, together with *crassipes*, constitutes a peculiar group, distinguished by the acute and prominent basal angles of the prothorax, coarse abdominal punctuation, and scabrous and asperate dorsal punctures.

C. crassipes n. sp.—Robust, moderately convex, oblong, subparallel, black, rather strongly shining; legs and antennæ rufous; vestiture as in *granulatus* but with the stiff, piceous, spiniform setæ very much longer. *Head* transverse; sides broadly rounded, feebly sinuate anteriorly at the epistomal suture; epistoma broadly bilobed at apex; upper lobe of eye very small, broadly oval; antennæ as in *granulatus*, the eleventh joint much narrower than the tenth. *Prothorax* fully two-thirds wider than the head, nearly one-half wider than long, the apex very feebly emarginate in circular arc, very slightly narrower than the base, the angles obtuse and very narrowly rounded; base transverse and straight except toward the sides where it is gradually sinuate, the basal angles being right, not at all rounded and posteriorly prominent, extending but slightly behind the median portions; sides strongly, evenly arcuate anteriorly, thence convergent and nearly straight to the base; disk widest at apical third, very finely, rather densely punctate toward the middle, with the punctures distinctly separated, becoming coarser, very densely crowded, shallow and scabrous but not coalescent, laterally. *Elytra* equal in width to the prothorax and but slightly more than twice as long, ovate, the sides distinctly arcuate; humeri rounded; apex acutely rounded, with each apical angle slightly and obtusely produced, forming a short caudal appendage; disk finely striate, the striæ feebly impressed, rather finely but deeply, distinctly and very closely punctured; intervals feebly convex, with the median portions rather finely, closely, unevenly and asperately punctate, the punctures smaller than those of the striæ. *Abdomen* coarsely, densely punctured toward base, more finely toward apex. *Legs* rather long, the tarsi robust.

Male.—Anterior tibiae very robust, the inner apical angle produced, broadly and obtusely toothed internally just before attaining the middle; abdomen

narrowly and very feebly impressed in the middle toward base, the fifth segment with a very deep transverse parallel-sided impression at the apex.

Length 4.7–6.0 mm.; width 1.9–2.7 mm.

California (southern).

Resembles *granulatus*, but differs in its much more robust and rather more depressed form, larger size, sparser pronotal punctures toward the middle, less acute and abrupt basal angles, much feebler but more coarsely punctate elytral striæ, longer dorsal setæ, much more robust and more strongly dentate anterior tibiæ of the male and more robust tarsi.

The prolongation of the apical angles of the elytra is also noticeable, but to a less extent, in *granulatus*, and in both is more characteristic of the female.

Crassipes and *granulatus* form the nearest approach to *Conibiosoma*, and thence to *Notibius*.

CONIBIOSOMA n. gen.

Body elongate, parallel, setose. Head broadly sinuate at the sides anteriorly; epistoma broadly, angularly sinuate; mentum small as wide as long, the sides very feebly reflexed, the surface flat, densely punctate, the apex inflexed; labial palpi inserted at the sides of the very short corneous ligula, their base concealed by the mentum; maxillæ very wide at base, the palpi normal. Prothorax fimbriate at the sides with very short, robust, posteriorly recumbent, spiniform setæ. Scutellum very short and wide, triangular, not entering at all upon the disk of the elytra. Abdomen with the fifth segment strongly inflexed in repose at least in the male. Legs moderate; anterior tibiæ not dilated.

This genus is closely allied to *Notibius*. The single species resembles *Conibius* in outward form, and constitutes a transition from *Notibius*, apparently having a greater affinity with the latter, although, if it were not for the fimbriate sides of the prothorax, it could be quite as easily assigned to the former.

C. elongata Horn.—*Conibius elong.*: Trans. Am. Phil. Soc., XIV, p. 351. —Elongate, parallel, moderately convex, shining, bright rufo-testaceous, the elytra black; vestiture consisting of short, stiff, spiniform setæ which are distinctly visible under low power. Head transverse, the sides near the eyes straight and parallel, the upper lobe of the latter small but broadly oval, much larger than the lower lobe; surface finely, rather sparsely punctate, the punctures shallow, variolate and subscabrous; antennæ very robust, compact, much shorter than the head and prothorax together, the three last joints moderately dilated, joints obconical, third much shorter than the next two,

eleventh but slightly narrower than the tenth. *Prothorax* two-fifths wider than the head and two-fifths wider than long; apex extremely feebly incurvate in circular arc, the angles narrowly but distinctly rounded; base a very little wider than the apex, broadly truncate and straight, except near the sides, where it becomes gradually sinuate, the basal angles acute, not at all rounded and distinctly produced posteriorly; sides rather feebly arcuate anteriorly, thence very slightly convergent and nearly straight to the apex of the basal angles; disk widest at apical third, very finely, sparsely punctate toward the middle, the punctures dense, coarser and slightly scabrous but not coalescent laterally. *Elytra* equal in width to the prothorax and but slightly more than twice as long; sides nearly straight; apex somewhat acute, each apical angle slightly prominent behind; disk with even rows of fine, moderately approximate punctures, the striæ extremely feebly impressed; intervals each with a single even row of punctures, which are of the same size and mutual distance as those of the striæ, but a little more asperate, each bearing a stiff seta, the setæ arising from the stria punctures being excessively minute. *Abdomen* finely reticulate, finely, somewhat sparsely, subasperately punctate, the pubescence rather fine and short but distinct. *Legs* rather short and slender.

Male.—Fifth ventral segment with a very large, transversely oval impression at the bottom of which there is a feeble transverse ridge.

Length 3.6 mm.; width 1.2–1.4 mm.

Southern California.

The two specimens before me are both males, so that I cannot determine whether or not the remarkable internal flexure of the fifth segment in repose is sexual in nature; it is probable, however, that this is the case. It is also very probable that the impression of the fifth segment, given above as a male sexual character, may be common to both sexes, this being the usual condition in *Notibius*.

NOTIBIUS Leo.

The sexual modification of the male becomes extremely feeble in this genus, and the species are otherwise so homogeneous as to suggest a more persistent and less plastic type than that of *Conibius*.

The fringe of setæ at the sides of the pronotum is more strongly developed than in *Conibiosoma*, and is so compact that under low power it appears to be simply a thickened marginal bead, or other analogous structure; at the sides of the elytra it is replaced by a fringe of more slender and much longer, erect and widely distant setæ. This is by far the most important structural character distinguishing *Notibius* from *Conibius*, and its presence in *Conibius elongatus*, proves that the latter should be associated with *Notibius* rather than the genus in which it was originally placed, but as the

anterior tibiæ are slender I have considered it preferable to separate it generically.

The anterior tibiæ are broadly triangular, which seems to indicate a burrowing habit, and in this connection it is at least interesting to note that *Ulus*, which is also fossorial, possesses the lateral fimbriæ which are so important here. Whether this is a mere coincidence, or whether the lateral setæ are dependent for their evolution in any way upon the burrowing habit, I cannot state absolutely at present, although this is rendered still more probable from the fact that *Cœlus* and *Cœlomorpha*, which are fossorial, also have the lateral fimbriæ well developed. The great minuteness of the eyes in *Notibius*, as well as the complete absence of wings, should be noticed in comparing it with *Ulus*, and apparently shows that while the latter genus passes a considerable portion of the time above ground, the former is more essentially subterranean.

In *Notibius* we first notice a decided change in the character of the punctuation, especially of the pronotum, where the presence of the transversely crescentic and asperate type gives a certain peculiarity of appearance. There is considerable variation however in this respect, the punctures, for example in *substriatus*, becoming coarse, deep, rounded and scarcely at all asperate toward the middle of the disk; these differences can perhaps best be made known by the following tabular statement:—

Third antennal joint feebly obconical, about twice as long as wide and but slightly shorter than the next two combined.

Elytral striæ not at all impressed, the series of very small, widely distant punctures exceedingly indistinct; pronotal punctures rather transverse but dense and strongly asperate; lateral margins of the pronotum generally distinctly and somewhat broadly explanate; color piceous-black, the anterior portions often slightly paler **puberulus**

Elytral striæ very feebly impressed, finely but distinctly and approximately punctured; pronotal punctures but feebly asperate toward the middle, the disk not explanate at the sides; color black throughout.

Pronotal punctures coarse, deep, rounded and conspicuous.

substriatus

Pronotal punctures very fine, feeble, sparse and transversely crescentiform..... **laticeps**

Third antennal joint very short, but slightly longer than wide, strongly constricted toward base and very much shorter than the next two combined; body bicolored; pronotum strongly punctate, the punctures but slightly wider than long **puncticollis**

The fifth ventral segment is always very broadly impressed, the impression deeper at the lateral extremities, appearing under certain angles of reflection as if distantly bi-impressed; this character appears to be independent of sex.

N. puberulus Lec.—Ann. Lyc. N. Y., V, p. 145.—Oblong-oval, convex, black; head slightly rufous; integuments smooth but rather dull; pubescence moderate in length, fine, sparse, recumbent and dark in color, not very conspicuous. *Head* transverse, feebly convex, deeply and broadly bilobed at apex, somewhat finely, moderately densely and asperately punctate, the punctures not contiguous and almost granuliform; upper lobe of eye very minute, much longer than wide; antennæ robust, much shorter than the head and prothorax, the last three joints wider, third a little shorter than the next two, eleventh almost circular, much narrower than the tenth. *Prothorax* one-half wider than the head and nearly one-half wider than long; apex much narrower than the base, strongly emarginate in circular arc, the angles narrowly rounded; base transverse, gradually, feebly sinuate very near the sides, the basal angles being slightly acute, not at all rounded and projecting posteriorly beyond the median portion; sides strongly arcuate, straighter in basal two-thirds; disk about equal in width throughout basal two-thirds, rather finely punctured, the punctures transversely arcuate, moderate in size, rather sparser toward the middle, denser laterally, asperate throughout. *Elytra* ovate, very little wider than the prothorax and slightly more than twice as long, but little longer than wide; sides distinctly arcuate; humeri obtusely rounded; disk finely, somewhat densely and evenly punctate throughout, with vague traces of series of widely distant punctures of the same kind. *Abdomen* rather strongly, asperately punctate toward base.

Male.—Not determined.

Length 4.8–5.5 mm.; width 2.5–2.7 mm.

California (Vallecitas) Cab. LeConte; (San Bernardino) Mr. Dunn.

The specimens before me exhibit no sexual impression toward the base of the abdomen, but have the fifth segment strongly bi-impressed as usual. The under surface and legs are rufous, the latter pale.

N. substriatus n. sp.—Oblong, somewhat robust, black, rather strongly shining; legs and antennæ rufous; pubescence nearly as in *puberulus*. *Head* transverse, bilobed at apex, somewhat coarsely, densely punctate, the punctures very strongly granuliform; upper lobe of eyes very minute; antennæ nearly as in *puberulus*. *Prothorax* about one-half wider than the head and one-half wider than long; apex much narrower than the base, feebly, evenly emarginate in circular arc, the angles narrowly rounded; base transverse, extremely feebly sinuate near the basal angles which are right, not rounded and extremely feebly, posteriorly prominent; sides evenly and rather strongly arcuate throughout; disk very distinctly wider in the middle than at base,

rather coarsely, deeply and strongly punctate, the punctures rather dense and asperate laterally, decidedly sparse, rounded and not asperate toward the middle. *Elytra* as wide as the prothorax and not more than twice as long; sides parallel and extremely feebly arcuate in basal three-fifths, thence very broadly rounded behind; disk with fine, very feebly impressed striae which are finely but deeply, distinctly and very closely punctured; intervals very sparsely punctate, the punctures similar to those of the striae except that they are slightly asperate. *Abdomen* rather strongly, asperately punctate toward base.

Male.—*Abdomen* broadly and distinctly impressed in the middle toward base.

Length 5.0 mm.; width 2.4 mm.

California (Majave Desert).

Allied somewhat to *puberulus*, but distinguishable by its feebly impressed, closely punctured elytral striae, those of *puberulus* being completely unimpressed and very distantly punctured, also by its coarser, deeper, sparser, less asperate and not transversely crescentic pronotal punctures, and much less posteriorly prominent basal angles of the prothorax.

N. laticeps n. sp.—Very robust, rather feebly convex, oblong, shining, very feebly alutaceous, black; head slightly rufescent; pubescence short, fine, sparse and recumbent, dark piceous in color. *Head* strongly transverse, angulate behind the eyes, the sides convergent anteriorly from the basal angles; epistoma very broadly bilobed; surface feebly convex, finely, sparsely punctate, the punctures strongly granuliform; upper lobe of eyes very minute; antennae nearly as in *puberulus*, the third joint rather more than twice as long as wide, the eleventh small. *Prothorax* two-thirds wider than the head and rather more than one-half wider than long; apex narrower than the base, narrowly truncate between the advanced and very broadly rounded apical angles; base transverse, feebly sinuate laterally, the basal angles being right not at all rounded and slightly posteriorly prominent; sides almost parallel throughout basal three-fourths, rather feebly arcuate, then rounded into the extremely broad apical angles; disk sparsely punctate, the punctures very fine, rather feeble and transversely crescentiform, not strongly asperate, a little more noticeably so but not distinctly denser laterally. *Elytra* very slightly wider than the prothorax and a little more than twice as long; sides feebly arcuate; apex ogival; humeri very broadly rounded; disk with distant, excessively feebly impressed rows of fine, closely-placed punctures, the punctures of the intervals similar in size but a little more asperate, sparsely and unevenly distributed. *Abdomen* finely, rather sparsely punctate, the punctures becoming more asperate toward base; pubescence rather long, fine and abundant. *Legs* bright rufous, rather long, the femora robust.

Male.—*Abdomen* extremely feebly and broadly impressed in the middle toward base.

Length 5.8–6.4 mm.; width 2.8–3.0 mm.

California (southern).

This is the largest species of the genus, and is quite distinct in its extremely fine, sparse and transverse pronotal punctures, more prominent basal angles of the head and several other characters; the sides of the prothorax occasionally become more strongly arcuate.

N. puncticollis Lec.—Ann. Lyc. N. Y., V, p. 145.—Oblong, rather strongly convex, dark rufo-ferruginous, the elytra black; moderately shining; pubescence fine, recumbent, moderate in length, dark and sparse. *Head* transverse, rather finely, somewhat densely and asperately punctate; sides near the base parallel and almost straight; epistoma very broadly bilobed; upper lobe of eyes very small, elongate; antennæ much shorter than the head and prothorax, rather robust, compact, the outer joints but feebly dilated, third joint pyriform, but very slightly longer than wide and conspicuously shorter than the next two which are equal, eleventh small. *Prothorax* distinctly less than one-half wider than the head, about one-half wider than long; apex narrower than the base, broadly truncate between the slightly advanced and broadly rounded apical angles, which are moderate in width; base very broadly, feebly arcuate in the middle, broadly and strongly sinuate laterally, the basal angles acute, not rounded and distinctly prominent posteriorly; sides subparallel, feebly arcuate; disk rather coarsely, strongly punctate, the punctures rather dense throughout but closer and more asperate laterally, almost rounded and scarcely asperate toward the middle. *Elytra* very little wider than the prothorax and distinctly more than twice as long; sides feebly, evenly arcuate; disk with fine, obsoletely impressed rows of very fine, rather distant punctures, the punctures of the intervals similar but slightly more asperate, rather sparse but not much more distant than those of the series, so that the latter are observable with difficulty. *Abdomen* finely, sparsely, asperately punctate.

Male.—Without distinct sexual characters.

Length 4.7–5.0 mm.; width 2.1–2.4 mm.

California (Sacramento Valley and El Dorado Co.).

The size and form of the third antennal joint and coloration of the body will be amply sufficient to distinguish this species, which is more northern in habitat than the others.

CYBOTUS n. gen.

Mentum moderate, nearly flat, deeply and roughly sculptured, but slightly wider than long, strongly trapezoidal anteriorly, the apex narrowly and feebly sinuate; ligula very short, sinuate in the middle, the connate paraglossæ furnished with very robust bright yellow bristles, the labial palpi attached at the sides under the apical portions of the mentum; fourth joint of the maxillary palpi robust, oval, the apex broadly truncate and having a conspicuous extensible white membrane; epistoma deeply sinuate. Prosteronum widely separat-

ing the coxæ, the process porrect, extending far behind them, the apex acutely angulate, loosely received in repose in an excavation of the mesosternum. Posterior coxæ narrowly separated, the process truncate. Base of the pronotum transverse and perfectly straight. Elytra connate, coarctate with the prothorax throughout the width. Tarsi very coarsely spinose beneath, the anterior not dilated in the male.

The form of the body is abbreviated, oval and strongly convex, and the genus seems to be rather isolated, having no decided bond of affinity with any other. It is remarkable in the structure of the terminal joint of the maxillary palpi, the apical cavity of which is filled with a tumid or apparently extensible white membranous mass. The single species is absolutely apterous.

C. estriatus Lec.—*Blapstinus est.*: Proc. Am. Phil. Soc., XVII, 1878, p. 420.—Broadly oval, very convex, dull and alutaceous, black, not pubescent but each of the fine punctures having an excessively minute erect seta, only distinctly visible under high power. Head transversely trapezoidal, rather convex, finely, somewhat unevenly but generally sparsely punctate; upper lobe of eye rather small and elongate; antennæ somewhat slender but short, not much longer than the prothorax, the outer joints very slightly wider, joints three to five uniformly and rapidly decreasing in length. Prothorax rather strongly transverse, about four-fifths wider than long, rather strongly narrowed from base to apex, the sides evenly and very feebly arcuate; apex very feebly emarginate in circular arc; base transverse; disk minutely and not densely punctate, subopaque, with a narrow polished and impunctate basal margin. Scutellum small. Elytra much wider than the prothorax and from two and one-half to three times as long; sides strongly arcuate, continuous in curvature with those of the prothorax, apex rather acute; disk very finely, not densely punctate, with very ill-defined, widely distant rows of similar punctures. Abdomen shining, finely but deeply, distinctly and rather densely punctate. Anterior tibiæ rather robust, compressed and in the form of an elongate triangle. Posterior tarsi with the fourth joint much shorter than the first three combined.

Length 3.5–4.7 mm.; width 2.0–2.8 mm.

Florida.

The rows of punctures on the elytra are quite distinct in some specimens, with a tendency to noticeable impression, but in others they are very indistinct. When the prothorax is slightly thrown back the pronotum almost completely covers the scutellum.

APHANOTUS Lec.

The two species of this genus differ by characters which in many parts of the family might readily be considered generic, but in this instance I do not think that they possess more than a specific value, because of the general resemblance throughout the remainder of the body, which is so marked that without close examination they might possibly be confounded. The differences may be expressed as follows:—

Eyes completely divided; last joint of maxillary palpi rounded at apex and scarcely perceptibly oblique; antennæ gradually strongly dilated toward apex, the outer joints compactly joined, the eleventh transversely truncate throughout the width and much wider than long **brevicornis**
 Eyes not completely divided; last joint of maxillary palpi truncate at apex, the truncation strongly oblique; antennæ rather less strongly dilated toward apex, the outer joints widely separated and perfoliate, eleventh slightly wider than long, oval, the apex strongly rounded throughout the width and with a large sensitive area..... **parallelus**

In general habitus, the two species can be distinguished by the more elongate elytra of *parallelus*.

A. parallelus n. sp.—Elongate, parallel, moderately convex, rufo-castaneous throughout, strongly shining, glabrous although each puncture has an excessively minute erect seta. *Head* about two-thirds as wide as the prothorax, slightly transverse, vertex rather convex, finely, densely punctate; epistoma subtruncate; eyes large, the dorsal portion oblique and gradually acuminate; antennæ with the third joint slightly longer than wide and distinctly longer than the second or fourth, the latter equal. *Prothorax* scarcely one-third wider than long; sides nearly parallel, evenly and rather feebly arcuate; apex just visibly narrower than the base, broadly, feebly emarginato-truncate, the apical angles being very slightly prominent but narrowly rounded; base transverse and very feebly bisinuate; disk rather coarsely punctate, the punctures shallow and variolate, finer and sparser toward the middle, very dense laterally. *Scutellum* moderate, slightly transverse. *Elytra* subequal in width to the prothorax and about three and one-half times as long; sides nearly straight; apex rather abruptly rounded; humeri acutely rectangular and very slightly prominent; disk with eight discal costæ which are abruptly elevated but very fine, the crest of each lying between two series of excessively minute punctures; intervals very feebly concave, each with a single series of fine, feeble, not very closely-set punctures. *Abdomen* finely, sparsely punctate, the punctures larger laterally. Length 5.0–6.0 mm.

Arizona (Benson). Mr. Dunn.

The description is taken from the male, the female not differing

very noticeably in the structure of the head, but having the prothorax fully one-half wider than long and the elytra nearly four times as long as the latter. It will be noticed in *Eulabis*, *Aphanotus*, *Eleates*, *Eledona*, and perhaps some other genera having the elytra finely costate, that the ridges are margined at each side with a row of minute punctures. This may possibly indicate a bond of mutual consanguinity.

PHALERIA Latr.

The eyes in some of our species of *Phaleria* are extremely large and separated beneath only by a very narrow interval. At first this might certainly be thought to indicate generic difference, but a series can be formed showing a gradual widening of the interval, until in *punctipes* the eyes are relatively not much larger than in the European *hemisphaerica* or our own *globosa*. A similar series can be formed showing a gradual lengthening of the metasternum from *globosa* to *longula* and others. We have here, therefore, two more variable elements in this unusually plastic genus.

P. gracilipes n. sp.—Very narrow, moderately convex, strongly shining, pale flavo-testaceous throughout, not at all maculate; margins not fimbriate. *Head* moderate, very minutely, feebly and sparsely punctate, the eyes very large, feebly emarginate by the sides of the head, separated beneath by a very narrow interval and with the inner sides acutely rounded; antennæ short and robust, joints six to ten wider than long, the eleventh as long as wide, obtusely rounded. *Prothorax* fully four-fifths wider than long, the apex about two-thirds as wide as the base, feebly, evenly emarginate in circular arc, the angles right and very narrowly rounded, not at all prominent; base transverse, the angles slightly obtuse but not distinctly rounded; sides evenly, feebly arcuate; disk impunctate, without trace of beaded basal margin but with two short feeble striate impressions which are widely distant and near the base. *Elytra* at base not distinctly wider than the prothorax, about three times as long as the latter, obtusely rounded at apex, distinctly striate, the striae very finely, indistinctly punctate, rather feebly impressed toward base, very deeply so toward apex, the intervals then becoming very strongly convex, extremely minutely, rather sparsely punctate throughout. *Abdomen* polished, very minutely and sparsely punctate. *Legs* rather slender, the posterior tibiae but slightly larger from base to apex and not very densely spinose. Length 4.5 mm.; width 1.9 mm.

Texas. Mr. W. Jülich.

The smallest and by far the most slender of the species with elongate metasternum, allied only to *debilis*, but very much more

shining and not granulose, with much less robust femora and decidedly less clavate and spinose posterior tibiae. In *debilis* the pronotum is finely but distinctly punctate and the elytral striae are more feebly impressed at base, the elytra being exactly equal in width to the prothorax.

In *gracilipes* the wings are very well developed, being much longer than the elytra.

PLATYDEMA Cast.

There are two species of this genus which are commonly confounded under the name *excavata* Say. One of these forms was recently described by me, from an abnormally small specimen, under the name *parvula*, and as Say's description will apply equally to both, the type being no longer in existence, I have thought it desirable to give differential diagnoses of the two species under names which have been already published; they may easily be separated by the following characters which are taken from the males:—

Form narrowly oval; eyes moderate; frontal excavation very large and deep, the horns separated by a distance which is equal to one-half the entire width; elytral intervals very minutely and sparsely punctate; femora sparsely and finely punctate throughout.....**excavata**

Form broadly oval; eyes much larger; frontal excavation small, moderate in depth, the horns separated by scarcely more than one-third the entire width; elytral intervals more convex, more strongly and densely punctate, the striae rather more deeply impressed; femora finely, rather more densely punctate, especially toward apex.....**parvula**

In addition to the characters given it should be stated that the frontal horns themselves are quite different in form; in *excavata* they are much longer and are perfectly straight, while in *parvula* they are shorter, stouter, more gradually acuminate from base to apex, and are arcuate and curved upward throughout their length.

The type of *opacula* appears to be a small and rather abnormal specimen of *ruficornis* Sturm; the head is more coarsely punctate than usual, but otherwise I can find no good character to distinguish it.

ELEATES Casey.

The genera of Bolitophagini may be distinguished as follows:—

Eyes emarginate in front.

Prothorax broadly pedunculate at base, the sides strongly, unevenly serrate; elytra each with four coarse widely interrupted ridges, the fourth less evident, the intervals unevenly punctato-tuberculose ... **Bolitotherus**
Prothorax not pedunculate at base, the sides not serrulate; elytra each with nine fine equal and entire costæ, the intervals uniseriately punctate.

Eledona

Eyes completely divided.

Head deeply inserted; pronotum lobed in the middle at apex, broadly pedunculate at base, the sides finely but strongly serrulate; elytra each with four interrupted ridges, the intervals each with two rows of coarse punctures separated by a finer interrupted ridge..... **Bolitophagus**

Head not deeply inserted, the eyes distant from the prothorax, the pronotum not, or but very feebly lobed, the base not pedunculate; sides not serrulate; elytra each with nine fine continuous and equal costæ, the intervals evenly and uniseriately punctate..... **Eleates**

It will be observed that *Eleates* is related to *Bolitophagus* in nearly the same way that *Eledona* is to *Bolitotherus*; in both of those first mentioned the sides of the prothorax are sometimes extremely feebly and indefinitely undulated, but never properly serrate. The species of *Eleates* may be defined as follows:—

Eyes coarsely faceted; sides of the pronotum broadly explanate.

Form robust, not more than twice as long as wide; apical angles of the prothorax distinctly rounded..... **depressus** Rand.

Form rather slender, always notably more than twice as long as wide; prothorax a little more than twice as wide as long, the apex deeply emarginate, the middle feeble arcuate; apical angles subacute and more narrowly rounded; disk very densely and rather more coarsely punctate, feebly impressed along the middle; elytra similar to those of *depressus* but distinctly longer, the punctures of the intervals a little coarser; under surface densely punctured. Length 5.6; width 2.2–2.3 mm.

Oregon..... **explanatus** n. sp.

Eyes finely faceted; form more convex; sides of the pronotum very narrowly reflexed..... **occidentalis** Cas.

I have before me a series of six specimens from Marin Co., California, which are exactly similar to the typical *explanatus* but uniformly smaller,—length 4.4–4.8 mm.; width 1.8–2.0 mm.

Explanatus is related to *depressus* in much the same way that *Coelus pacificus* is to *guttulatus*, *Lypsimena californica* to *fus-*

cata, *Acanthocinus princeps* to *spectabilis*, *Pentaphyllus californicus* to *pallidus*, and numerous other examples, where, in each case, the representatives on the two sides of the continent are quite certainly specifically distinct, but allied sufficiently to indicate probable divergence from a common ancestor in comparatively recent geological time.

HELOPS Fab.

The species which have been associated under this name form, in our fauna alone, a most difficult study. I will not attempt at present to assign the following species to any of the numerous genera which have been created at the expense of *Helops*, but will simply indicate their relationship with described species.

H. ovipennis n. sp.—Rather broadly oval, distinctly depressed above, perpendicular at the sides of the elytra, black, with a feeble greenish-aneous tinge, polished. *Head* rather wider than long, extremely coarsely, deeply, not very densely but unevenly punctate; eyes rather more prominent than the sides before them; epistoma subtruncate at apex; antennæ wanting in the type. *Prothorax* twice as wide as the head and fully three-fourths wider than long; apex but slightly narrower than the base, broadly, distinctly emarginate between the slightly advanced but obtuse and distinctly rounded angles; base transversely, very evenly truncate; basal angles right, not rounded and distinctly prominent; sides parallel, moderately arcuate, nearly evenly so to within one-fifth the length of the base where they become strongly convergent, very strongly sinuate just before the basal angles; disk transversely, rather feebly convex, with a feeble and uneven median impressed line which is coarsely, unevenly punctate, but on each side of which the disk is smooth for a short distance, distinctly explanate near the sides, extremely coarsely, deeply, very unevenly punctate, the punctures impressed and coalescent. *Elytra* oval, a little more than three times as long as the prothorax and, in the middle, fully two-fifths wider; sides strongly, evenly arcuate; humeri completely obsolete, very broadly arcuate; apex somewhat acutely rounded; disk with deep and widely impressed sulci which are coarsely and approximately punctate, the punctures rounded; intervals very strongly convex, very finely, extremely sparsely and unevenly punctate, more or less widely interrupted, more frequently and thoroughly so near the apex, especially the alternate intervals; epipleuræ very wide, extremely dilated toward base where they are fully one-half as wide as the entire metasternum including the episterna. *Abdomen* longer than the entire remainder of the body including the head, transversely convex, polished, almost completely impunctate, each segment with a large feeble oviform impression near the side; metasternum extremely short, between coxa and groove less than one-half as long as the first ventral segment. *Legs* rather short and slender, finely, extremely

sparsely punctate, the posterior tibiae arcuate throughout the length, nearly glabrous but abruptly and very densely, finely pubescent near the apex, especially internally; tarsi wanting in the type. Length 15.5 mm.; width 6.7 mm.

California (Mojave Desert).

A single mutilated specimen of this unusually isolated species was found dead by Mr. Dunn in a decaying stump. It cannot be compared with any other of our species and is remarkable because of its oval elytra, with very wide epipleuræ and totally obsolete humeri, and its extremely coarsely and deeply sculptured but polished upper surface. It is one of our largest species.

Although the punctures of the elytral series are coarse, they are not as wide as the impressed sulci and only about one-fourth as wide as the intervals.

H. guadalupensis n. sp.—Elongate, subparallel, convex, shining, piceous-black; under surface and legs dark rufopiceous; antennæ fuscous. *Head* a little wider than long, very coarsely, deeply punctate, the punctures forming long interlacing rugæ, but finer, round and distinctly separated on the epistoma, the latter truncate; eyes transverse, very strongly convex, more prominent than the sides before them; antennæ slender throughout, two-thirds as long as the elytra in the male, one-half as long as the latter in the female, tenth joint more than twice as long as wide in the male, one-third longer than wide in the female. *Prothorax* about one-fourth wider than long; apex equal in width to the base, broadly, evenly arcuate throughout, the angles right and narrowly rounded; base truncate; basal angles very broadly obtuse and rounded; sides parallel, very evenly and rather feebly arcuate throughout; disk evenly, feebly, transversely convex, coarsely, very deeply and extremely densely punctate throughout, the punctures forming short interlacing furrows and very narrow intervening rugæ, not appreciably sparser toward the middle in the male, but slightly so in the female. *Elytra* three times as long as the prothorax and more than one-third wider, parallel, the sides but just visibly arcuate; humeri distinct but narrowly rounded; disk with fine but deep and abrupt striæ which are finely catenulate, the punctures totally disappearing toward apex; intervals very feebly convex, extremely minutely and sparsely punctate, each with a single series of small feeble and distant tubercles, only visible toward the sides and apex. *Abdomen* finely but distinctly and somewhat sparsely punctate; metasternum between coxa and groove subequal in length to the first ventral segment in both sexes. *Legs* rather long and slender, the hind tibiae straight, pubescent throughout; anterior tarsi very feebly dilated in the male. Length 11.0 mm.; width 4.2 mm.

Island of Guadalupe.

This species is to be placed near *bachei* Lec., but in considering it a variety of that form, Dr. Horn (Trans. Am. Ent. Soc., V, p. 201) has overlooked an important structural character relating to the

prothorax. In *bachei* the sides of the prothorax, in a vertical direction, are narrowly rounded, without trace of marginal bead, while in *guadalupensis* they are acute and have a fine acute marginal bead throughout the length. Among other differential characters of *bachei* may be mentioned the elytra not distinctly wider than the prothorax and without grooved striæ, having simply rows of fine punctures which extend to the apex, the metasternum much shorter, and the penis acutely produced at apex and not grooved; in *guadalupensis* it is broader and narrowly truncate, with a broad dorsal groove; in these species the penis is sparsely clothed with short robust spines which are reflexed in position, like the teeth of certain reptiles. Both of the species here compared are distinguished from others by the small widely spaced tubercles of the elytral intervals, which are more pronounced in *bachei*; this character may indicate a community of origin, but at the present time they are certainly abundantly distinct. There are certain characters also which ally the present species to *cisteloides*, the male intromittent organ being truncate in that species and differing very strikingly from the finely acuminate apex as seen in *bachei*.

H. callosa n. sp.—Elongate-oval, very convex, feebly shining, castaneous to piceous throughout, sometimes paler beneath. *Head* fully as long as wide, rather coarsely, extremely densely punctate and dull, the punctures closely crowded throughout; apex transversely truncate; eyes a little more prominent than the sides before them, very strongly convex, transverse and surmounted by the usual very deep groove; antennæ one-half as long as the body, rather robust but not in the least incrassate, joints eight to ten just visibly decreasing in length, the latter one-half longer than wide, eleventh longer. *Prothorax* one-fifth wider than long, the apex just perceptibly wider than the base, broadly, feebly arcuate, the angles slightly obtuse and narrowly rounded; base transversely truncate; basal angles obtuse but not in the least rounded, distinct but not prominent; sides feebly arcuate anteriorly, slightly convergent and more nearly straight thence to the base; disk usually widest a little before the middle, coarsely, very deeply and extremely densely punctate throughout; sides rather obtuse but with a fine beaded margin which is invariably present near the base and sometimes traceable throughout the length. *Elytra* elongate-oval, about three times as long as the prothorax and, in the middle, scarcely one-fourth wider; humeri slightly obtuse, not distinctly rounded but not in the least prominent; apex rather narrowly rounded; disk with distinctly impressed striæ, which are coarsely, deeply punctate, the punctures approximate, perforate and greatly elongate; intervals moderately convex but very strongly so toward apex, extremely finely, sparsely and irregularly punctate. *Abdomen* rather coarsely, moderately densely punctate; metasternum between coxa and groove equal in length to the first ventral

segment. *Legs* long, moderately slender; posterior tibiae slender, straight, pubescent throughout; femora coarsely, deeply and densely punctate. Length 5.6–9.0 mm.; width 2.0–3.3 mm.

New Mexico (Fort Wingate). Dr. Shufeldt.

The description is taken from the male; the female does not differ greatly but is larger, the antennæ slightly longer than the head and prothorax, joints eight to ten decreasing rapidly in length, the latter but slightly longer than wide, the elytra a little more inflated and from one-third to one-half wider than the prothorax.

This species is allied to *attenuata* Lec., but differs in its shorter, more transverse prothorax, with less strongly arcuate apex, and in the much more impressed and coarsely punctate elytral striae. It varies greatly in size, but the prothorax is equally transverse throughout the seven specimens which I have before me. The epipleuræ are narrow throughout as usual.

CERAMBYCIDÆ.

ERGATES Serv.

Subgen. TRICHOCNEMIS Lec.

The high regions of New Mexico and southern Colorado constitute a peculiar faunistic region or province, containing a large proportion of strictly endemic species; in support of this statement scores of examples might easily be cited. The genera to which these species are referable are generally widely distributed, but in several instances which may or may not be indicative of a more general tendency, the genus—as in *Thyce*—reappears only in the true Pacific coast fauna, without inhabiting the intervening districts as far as known

For a long time past we have had specimens in our cabinets, belonging to the present genus, from New Mexico, and others from northern California to British Columbia, but none whatever from the intermediate regions; this fact alone should have led us to examine these specimens somewhat critically. It may be stated as the result of such an examination that the well-known rule above mentioned is thoroughly supported in this case, for it is perfectly evident that the New Mexican form is specifically distinct from the California representatives called *spiculatus* by LeConte, and subse-

quently described under the names *Macrotoma californica* and *spiculigera* by White.

The differences may be expressed as follows the characters referring to the males only :—

Genæ produced in a very acute dentiform process at apex ; third antennal joint subequal in length to the prothorax ; metasternum with a fine carina almost throughout its length ; densely pubescent pads of the posterior tarsi not divided by a glabrous line except near the base of the first joint ; fifth ventral segment with the sides strongly convergent from base to apex, the latter about one-half as wide as the base, very feebly incurvate, the angles obtuse but not at all rounded ...**spiculatus** Lec.

Genæ rectangular, not rounded but without acute process ; third antennal joint distinctly longer than the prothorax ; metasternum without median carina except in posterior third ; spongy-pubescent pads of the posterior tarsi divided throughout by a fine glabrous line ; fifth ventral segment having the sides feebly convergent, the apex fully three-fourths as wide as the base, broadly, strongly sinuate, the angles extremely obtuse and indistinct**neomexicanus** n. sp.

In general habitus the two species are easily distinguishable, the prothorax and elytra of *spiculatus* each being much longer and more convex than in *neomexicanus*, but the differences in the sexual modifications at the apex of the abdomen—shown on the accompanying plate—are of course conclusive.

The American representatives of *Ergates* differ from the European, to a considerable extent, in the length of the antennæ and anterior legs in both male and female, and also in the denticulation of the sides of the prothorax, one of the median teeth being much stronger than the others in the European species. It seems proper therefore that the name *Trichoenemis* Lec. should be preserved, if not with full generic value, at least as a subgenus.

TRAGOSOMA Serv.

I have before me representatives of three species assignable to this genus, which differ widely among themselves ; they may be distinguished as follows :—

Head and prothorax very finely and extremely densely punctate, densely and conspicuously pilose.....**harrisi**

Head and prothorax almost glabrous, very coarsely and sparsely punctate.

Antennæ glabrous**spiculum**

Antennæ finely pubescent**pilosicornis**

Although the last two species differ conspicuously from *harrisi*, I have been unable to detect the slightest generic divergence. The metasternal side-pieces being triangular, more strongly so and also a little shorter in *spiculum* than in *pilosicornis*.

T. spiculum n. sp.—Form rather slender, parallel, moderately convex, shining throughout, dark castaneous; upper surface almost glabrous, the hairs growing from the sparse pronotal punctures very short and inconspicuous; sterna rather densely pubescent, the hairs not very long; abdomen sparsely but distinctly pubescent. *Head* nearly as long as wide, coarsely, unevenly punctured; eyes large, nearly as in *harrisi* but more narrowly separated above and beneath; antennæ five-sixths as long as the body, robust, strongly compressed, glabrous, finely, extremely densely punctato-scabrous and rather dull, first, second and the extreme basal part of the third joints only, polished and coarsely punctate; basal joints in length proportioned nearly as in *harrisi*, eleventh joint very long and slender, compressed, fully two-thirds as long as the tenth and abruptly narrower in apical third. *Prothorax* scarcely one-third wider than the head, a little less than twice as wide as long; base and apex feebly lobed in the middle; disk very convex, almost perpendicular at the sides, the marginal line not very prominent; median groove entire, broadly, feebly impressed, the surface throughout very coarsely and unevenly punctate, sparsely so toward the middle, very coalescently on the flanks; sides feebly, almost evenly arcuate, the spiniform process situated behind the middle, abruptly projecting and spiculiiform. *Scutellum* glabrous, coarsely punctate. *Elytra* parallel, a little more than twice as long as wide, nearly seven times as long as the prothorax and, in the middle, about two-thirds wider, truncate at apex, the sutural spines broad, short and everted; disk with punctures and raised lines almost as in *harrisi*, the punctures being coarser and not so dense. *Legs* and tarsi slender. Length 23.0 mm.; width 8.0 mm.

New Mexico (Las Vegas). Mr. H. Meeske.

Differs greatly from both *harrisi* and *pilosicornis* in the evenly arcuate sides of the prothorax, with the processes very abruptly projecting therefrom as slender spikelets. The description is taken from the only known specimen which is a male, the apex of the fifth ventral segment being broadly sinuate in circular arc, the lateral angles obtusely rounded, the edge fimbriate with extremely short fine hairs, and having a convex bevel.

T. pilosicornis n. sp.—Rather slender and depressed, moderately shining, pale castaneous-brown throughout, the upper surface almost glabrous, the hairs on the pronotum short and sparse. *Head* scarcely as long as wide, coarsely but rather densely punctate; eyes large, rather narrowly separated above and beneath, deeply, angularly emarginate near the upper extremity;

antennæ very slender, not compressed, nearly three-fourths as long as the body, joints proportioned in length nearly as in the female of *harrisi*, rather finely and densely punctate throughout, distinctly, moderately densely pubescent, the pubescence becoming extremely short but denser toward apex. *Prothorax* a little more than twice as wide as long measured from the base of the spines; apex subtruncate, slightly narrower than the base, the apical angles right, not rounded, slightly everted and laterally prominent; base transverse, very broadly, feebly lobed in the middle; sides obtusely angulate, the spines slender, erect, rather long, feebly turned backward toward apex; disk strongly impressed along the basal margin, without distinctly impressed median line, very coarsely, deeply punctate, the punctures very widely and sparsely scattered toward the middle, extremely coarse, dense and unevenly coalescent laterally, the surface gradually declivous toward the sides, the lateral margins acute, the hypomera extremely finely densely punctate. Scutellum with short sparse pubescence. *Elytra* parallel, about two and one-third times as long as wide, six times as long as the prothorax and about one-third wider; apex truncate and bisinuate, the sutural spines long, slender and straight; disk with very feeble elevated lines which are obsolete in basal and apical third, very coarsely, deeply but not very densely punctate toward base, the punctures gradually becoming smaller and denser from base to apex. *Sterna* with very short, moderately dense pubescence. *Legs* extremely slender throughout, moderate in length. Length 24.6 mm.; width 8.3 mm.

California (Mt. Diablo).

Although represented by a single female, I have no doubt of the specific distinctness of the present species; from the female of *harrisi* it of course differs completely, and from the male of *spiculum* it differs radically in the nature of the elytral sculpture, in the form of the sutural spines and in the extremely fine dense punctuation of the hypomera, these being completely impunctate, smooth and polished, with the exception of a few scattered punctures near the upper margin anteriorly, in *spiculum*. The marked pubescence of the antennæ, together with the characters above enumerated and many others, in addition, which are perfectly asexual in *harrisi*, seem to show that the species is not closely related to *spiculum*.

The type was received from Mr. Dunn with the indicated locality attached, but it is quite remarkable that such a conspicuous species should have remained undiscovered in a region so densely populated, and the locality may therefore possibly be erroneous.

APPENDIX.

NOTES.

I.

Since the assignment of *Lycopsis* (*ante* p. 311) to the *Colydiidæ*, I have been far from satisfied with this disposition of it, and have therefore made some additional comparative studies, the result of which indicates the decidedly greater propriety of associating it with the *Trogositidæ*. Here, however, if we regard tarsal structure as of primary importance, it must constitute a distinct tribe, but if tarsal structure be found to be of subordinate value as it is in the *Passandrinæ* for example, the genus should be placed near *Grynocharis* in the subfamily *Peltinæ*, where its very remarkable antennæ will at once isolate it. In any event it is a transitional type between the *Trogositidæ* and the *Cucujidæ*.

The tarsi are slender and undilated and appear to be perfectly tetramerous—as previously described,—with the first joint smaller than the second or third.

The anterior coxæ are very small, transverse and pointed outwardly, but are far more feebly developed than in *Grynocharis*, being much narrower than the distance separating the apex from the lateral margin of the pronotum; in *Grynocharis quadrilineata* the latter distance is scarcely more than two-thirds as great as the coxal width.

II.

The comparative scarcity of fossilized remains of the *Coleoptera*, makes the problem of determining the mutual affinities of the forms at present existing on the earth, a rather more difficult one than in the case of vertebrates, where the ancestry can often thus be quite conclusively traced, and among the *Coleoptera* there is no portion of the complex clavicorn series, so difficult to classify in a natural manner, as those groups clustering about the genera *Colydium*, *Rhysodes*, *Lyctus*, *Monotoma*, *Silvanus*, *Passandra*, *Cucujus*, *Telephanus* and *Hemipeplus*. These are, judging from their very

numerous affinities in widely different directions, in all probability the direct and comparatively unmodified descendants of extremely ancient types, from which have diverged at different epochs a large proportion of the modern representatives of the order.

To discuss all or even a considerable part of the relations indicated by the genera mentioned, would be quite impossible at the present time. Perhaps the strongest is in the direction of the Tenebrionidæ, for this is evidenced very plainly in many ways:—in *Rhysodes* by the antennæ with porous sensitive areas toward the distal extremities of the last five joints, also visible in *Brontes*, *Hectarthrum* and *Passandra*, and by its large mentum; in *Lyctus* by the large mentum; in the *Colydiinæ* by the antennæ of *Rhagodera* and *Anchomma*; in the *Passandrinæ* by the antennæ of *Narthecius*, with its small terminal joint, and in the arcuate impression of the last ventral segment homologous with that of *Zopherus*; in the heteromerous male tarsi of the *Cucujinæ*; and finally and even more decidedly, in the completely heteromerous tarsi of *Hemipeplus*.

The rhynchophorous relationship is indicated by the larva of *Lyctus* and the prosternal structure of many colydiides, also by the solid antennal club of the *Monotominæ* and many of the *Colydiinæ*. Rather more obscure adephagous and cerambycide affinities have been noted by authors in *Rhysodes*, and *Lyctus* is said to possess some serricorn affinity through the *Cisinæ*.

That *Lyctus* is however really a clavicorn belonging near the *Cucujinæ*, does not seem to admit of any reasonable doubt for:

1 The tetramerous tarsi of *Narthecius* and the *Colydiinæ* have been derived from the pentamerous by the atrophy of the first joint, clearly shown in an intermediate stage in *Lyctus*, and also, it should be added, in a still more advanced stage in *Prostomis*. The tarsus of *Lyctus* is in fact very similar to that of *Læmophilæus*. It should also be remarked in this connection, that the antennæ of *Lyctus* are precisely identical in structure with those of *Berginus*.

2 The rhynchophorous relationship of some of the colydiides—notably *Nematidium*—has been observed by LeConte (*Trans. Am. Ent. Soc.*, 1875, p. 168). Now in *Lyctus* this relationship is also evident but at an earlier stage of development, the larva of *Lyctus* being described as very similar to that of the *Scolytidæ*. Although this does not prove that *Lyctus* and *Nematidium* are related, since their resemblances to *Rhynchophora* may have been derived along lines of development convergent upon *Rhynchophora* but from

widely different directions, still I believe this fact should be mentioned as being at least of possible significance.

3 The mentum in *Lyctus*, and especially in *Trogoxylon*, is very large, filling the entire width of the gular opening and concealing a large portion of the maxillæ. In *Rhysodes* the enormous mentum is perhaps the most marked peculiarity of the genus, this organ being developed to a degree probably unknown in any other coleopteron. It seems probable that *Lyctus* may be related in this way to *Rhysodes*, and thence to the *Cucujinæ*.

4 All the important characters of *Lyctus*, other than those referred to, find their very satisfactory counterparts among various representatives of the *Cucujidæ* in the broad sense in which the family is here considered, and it is not at all easy to perceive any very striking serricorn characteristics. In fact no systematist who has placed *Lyctus* in the serricorn series has ever dwelt with great emphasis upon any particular character as proof of the relationship. DuVal, who seems to have been most candid in this respect, cites the form of the anterior coxæ as a reason for refusing it a place in the *Cucujidæ*, and the divergence of the larva from that of *Cryptophagus* as a reason for disregarding its general clavicorn affinities. The first of these reasons is of but little moment, as the anterior coxæ have many parallels among normal cucujides,¹ and the second is not decisive, for as shown by Lacordaire, the form of the larva allies it to the *Scolytidæ* rather than to the *Bostrichinæ*,—assuming of course that the larva has been correctly identified,—and as the *Colydiidæ* are also known to have rhynchophorous affinities, this argument is rather more effective for a clavicorn than for a serricorn relationship.

Regarding the *Cucujidæ* therefore as a family of *Clavicornia*, in which the anterior coxæ are small, rounded, deeply inserted and never decidedly prominent, and the tarsi generally slender, I would include within its limits the following subfamilies:—

Genæ with large porrect processes; tarsi isomerous in both sexes, but either pentamerous, subtetramerous or tetramerous; antennæ moniliform or clavate *PASSANDRINÆ*

Genæ without porrect processes.

Tarsi tetramerous; antennæ frequently with a solid club.

Elytra entire *COLYDINÆ*

¹ I fail completely to see how the anterior coxæ of *Lyctus* can be considered "conical and prominent" as stated by DuVal. This is simply a question of observation and can be easily verified.

- Elytra slightly abbreviated, exposing the pygidium; posterior tarsi 3-jointed in the males.....**MONOTOMINÆ**
- Tarsi pentamerous in both sexes.
- Antennæ moniliform; mentum extremely large, concealing all the organs of the mouth**RHYSODINÆ**
- Antennæ with a 2-jointed club; mentum very large, concealing the maxillæ at the sides.....**LYCTINÆ**
- Antennæ with a 3-jointed club; mentum always moderate**SILVANINÆ**
- Antennæ filiform, the first joint usually long; labial palpi with the third joint very strongly developed; tarsi with the first joint small.
- BRONTINÆ**
- Tarsi pentamerous in the female, heteromerous in the male, the first joint small; antennæ very variable, submoniliform, filiform or clavate; labial palpi with the last joint variable.....**CUCUJINÆ**
- Tarsi heteromerous in both sexes, broadly dilated, the penultimate joints bilobed, first long; antennæ combining the elements of the Brontinæ and Rhysodinæ, thick, monilo-filiform, the elytra slightly abbreviated as in the Monotominæ.....**HEMIPERLINÆ**

These subfamilies, while exhibiting the most diverse and bewildering affinities and cross affinities in various external directions, are nevertheless so intimately bound together by certain general peculiarities of organization, that we are compelled either to regard them as constituents of one very composite family, or to consider each as a distinct family. There seems to me but little doubt that the former is the better course to take.

The Passandrinæ include three tribes, Passandriini, Prostomini and Nartheciini, depending upon the nature of the jugular pieces and the antennal structure.

The Colydiinæ comprise the genera at present composing the family Colydiidæ, the Murmidiini forming a tribe allied to Cerylonini and not a subfamily.

The Monotominæ include two tribes, Monotomini and Myrmexicheniini, Hypocopus bearing a relation to Monotoma which is almost precisely equivalent to that borne by Smicrips to Rhizophagus. Through the Monotominæ the Cucujidæ are connected with the Nitidulidæ by way of the Rhizophagini. In the Monotomini the number of tarsal joints is four throughout, with the third joint rather smaller than the others, especially in the anterior, but in the males the posterior tarsi are 3-jointed through the elimination of the first joint; this is an additional point of similarity between Monotominæ and Cucujinæ.

The Brontinæ may be divided as follows:—

Tarsi cylindrical.

Basal joint almost obsolete, not distinct.....**Brontes**

Basal joint small but very distinct, slightly swollen obliquely beneath.

Dendrophagus

Tarsi strongly dilated; basal joint small but strongly, obliquely produced beneath the basal parts of the second joint.

Third tarsal joint obliquely produced beneath in a truncate or rounded lobe; basal joint of the antenna elongate; fourth joint of the maxillary palpi large and securiform.

Antennæ slightly thickened toward apex**Psammæcus**

Antennæ normally filiform throughout**Telephanus**

Third tarsal joint very deeply bilobed; first antennal joint short, oval; fourth palpal joint slender, conoidal.....**Cryptamorpha**

There can be no doubt whatever that these genera should be associated together. The tarsus of *Brontes* is truly very different from that of *Telephanus*, but that of *Dendrophagus* is a tolerably good intermediate, especially in the structure of the basal joint. The antennæ are of precisely the same type throughout, and the tarsi are isomericous in both sexes.¹ The genus *Platamus* of Erichson is the only one described which is not included in the table; it is allied to *Brontes* but differs in its less elongate basal joint of the antennæ.

The *Cryptophagidæ* which are allied to the *Cucujidæ*, but distinguished by the transversely oval and sometimes distinctly more prominent anterior coxæ, should be composed of the subfamilies *Cryptophaginæ*, *Mycetophaginæ*, *Cisinæ* and *Sphindinæ*.

The principal reasons advanced by the earlier systematists,—to whose views Lacordaire deferred somewhat against his will,—for considering the *Cisidæ* a family of the *Serricornia*, were in great measure superficial and based upon a general resemblance to the *Anobiini*, as expressed by the generally cylindrical form of body and somewhat retractile head. On examining the anatomical structure of the under surface I perceive no radical difference whatever between *Cis* and many of the *cryptophagides*, and have no doubt at all that the genus is really *clavicorn*. It cannot be denied, however, that the morphological resemblances to the *anobiides* above

¹ The three specimens of *Cryptamorpha desjardensi* (= *hubbardi* Cas.), before me, two of which I believe to be male and female from certain differences in the antennæ, have the hind tarsi normally pentamerous throughout. The statement made by Wollaston—apparently with some misgiving—that the tarsi of the male are heteromerous is open to the gravest doubt.

alluded to, undoubtedly indicate an obscure and innate line of consanguinity; this is indeed quite conclusively proven by the fact that in *Rhipidandrus*, which seems to be more closely allied to *Cis* than to any other genus, the antennæ are strongly pectinate toward apex, the pectinate portion forming an angle with the basal portion. This character, however, when weighed against its general organization, does not make it a serricorn, any more than the purely clavate antennæ of *Hydnocera* prove the latter to be a clavicorn.

It does not seem possible in this connection to avoid attaching some weight to the resemblance, pointed out by Lacordaire, between the larva of *Cis* and *Cryptophagus*,¹ and, it may be added, the superficial resemblance of certain cisides to *Diplocælus* is very remarkable, even more so in fact than the real resemblance of any species of the former which I have examined to any anobiide or bostrichide.

The retractibility of the head in *Cis* is generally very slight and is scarcely greater in degree than in some species of *Atomaria*. In the latter I do not find the anterior coxæ rounded, but transversely oval, exactly as in *Cryptophagus*. *Sphindus* is quite certainly not entitled to rank as a distinct family whatever be the position assigned it; the enlarged basal joint of the antennæ is analogous to that of *Atomaria*. In the latter genus the anteriorly prominent clypeus between the antennæ is indicative of a characteristic which becomes very prominent in certain cisides.

In the *Cryptophagidæ* as here considered, the parts which seem to offer the greatest diversity of form are the clypeus and tarsi; most of the other characters appear to be very persistent in structure. The tarsi of *Telmatophilus* and *Loberus* are analogous in taxonomical import to those of *Telephanus* and *Psammæchus* of the *Cucujidæ*.

It should be noted in conclusion that the scope here proposed for the families *Cucujidæ* and *Cryptophagidæ*, brings together in the

¹ In placing the *Cisidæ* near the *Ptinidæ* DuVal (Gen. Col. III, p. 236), seems to imply by the language used that the resemblance of the larva of *Cis* to that of *Cryptophagus* is a matter of very slight importance, as so little is known of larval affinities, but two pages before in maintaining that the *Lyctinæ* do not belong near the *Cucujidæ*, he assumes the divergence of larval form as a very powerful factor in his argument—an inconsistency which, it may be added, greatly reduces the weight of M. DuVal's conclusions as far as comparative studies of the larvæ are concerned.

former the greater part of the subcortical clavicorns, and in the latter a large proportion of those having fungivorous habits. From purely biological considerations therefore this arrangement would seem more natural than the wide dispersal of these perplexing groups of genera now considered necessary.

III.

The present opportunity is taken to give the general characters of an interesting addition to the Cucujidæ.

PLANISMUS n. gen. (Silvaninæ).

Body subparallel, rather depressed, extremely sparsely, inconspicuously pubescent. Head porrect. Eyes at the base near the prothorax, very large, convex and prominent. Epistoma slightly prolonged, transversely truncate at apex; suture entirely obliterated. Labrum short, transverse. Mandibles very robust but short, flattened, deeply notched at apex, bicarinate at the sides, the interval with a line of short robust setæ, the under surface longitudinally excavated in arc, the feeble excavation bounded internally by a very fine raised line. Mentum rather large, transverse, with a triangular carina. Labial palpi moderate, the third joint longer and a little thicker than the first two combined, longer than wide, oval, narrowly truncate at apex. Maxillary palpi cylindrical, the fourth joint as long as the first three, slender, much narrower than the second or third, cylindrical and very feebly arcuate. Antennæ robust, 11-jointed, with an abrupt loose and parallel 3-jointed club. Pronotum with a short longitudinal carina on each side in basal third or fourth and at lateral fourth. Scutellum short, transversely oval. Elytra with feebly impressed rows of distinct impressed punctures, the scutellar series long. Prosternum distinctly but not widely separating the coxæ, the process prolonged slightly and expanded behind them, the apex truncate and resting loosely on the anterior margin of the mesosternum. Anterior coxæ small, rounded, deeply inserted, the cavities narrowly closed behind; intermediate larger, rounded, moderately separated; posterior transverse, rather approximate. Legs rather short and robust; tibial spurs minute; tarsi 5-jointed throughout, the basal joint much longer than the second, the fourth very small, fifth slender, as long as the three preceding combined; first three very robust and, on all the tarsi, having each a finely spongiöse pad beneath; unguis moderate, slightly dilated internally near the base. Abdomen consisting of five nearly equal free segments, the sutures fine and straight.

This genus belongs near *Nausibius*, but differs in the more robust and spongiöse tarsi, in its much less broadly closed anterior coxal cavities, and very greatly in general appearance. In some respects it seems to be intermediate between the *Silvaninæ* and *Cucujinæ*,

but in antennal and tarsal structure it is as strongly silvanide as any other.

P. floridanus n. sp.—General form elongate-oval; integuments polished, dark rufo-testaceous. *Head* rather finely but deeply and somewhat densely punctate; antennæ about one-half longer than the head. *Prothorax* about one-half wider than the head and two-fifths wider than long; apex a little narrower than the base, truncate, the apical angles slightly obtuse but not rounded and just visibly prominent anteriorly; base very feebly arcuate, the angles distinctly rounded but with the extremity of the basal bead forming a minute prominent lateral point; sides very feebly convergent from base to apex, evenly, very feebly arcuate, without trace of inequality, the marginal bead finely, feebly reflexed; disk evenly, very feebly convex, rather sparsely, somewhat coarsely but feebly punctate, the regions near the basal carinæ very feebly impressed. *Elytra* twice as long as the head and prothorax combined, in the middle nearly one-fourth wider than the latter, the two bases equal; sides parallel, broadly, feebly, evenly but distinctly arcuate; apex evenly rounded; disk feebly but almost evenly convex, the punctures of the series deep and distinct, the intervals each with a single series of widely spaced very minute and scarcely visible punctures bearing fine recumbent hairs. *Abdomen* polished, finely, not densely punctate. Length 3.4 mm.

Florida (Biscayne Bay). Mr. Schwarz.

The elytral suture is finely beaded, the bead becoming very evident toward apex, where also the surface near the suture becomes distinctly impressed.

IV.

The cabinet formed by the late Dr. G. M. Levette, of Indianapolis, which has just come into the possession of the writer by purchase, contains a large amount of valuable material, especially from the Carolinas, Georgia, Florida and Colorado, much of which was probably collected by Morrison. A large proportion of this material is either undetermined or erroneously identified, but its value may be inferred from the fact that in the field covered by the present paper, I observe specimens of *Emmenastus fallax*, *Epitragus fusi-formis*, *Asida angustula* and *quadricollis*, *Coniontis pallidicornis*, *genitiva*, *parallela*, *parviceps*, and *setosa*, *Eleodes arcuatus* and *E. prominens*; also *Helops impolita* and *tumescens*, and several remarkable new forms which will be made known at a future opportunity.

In this material there is a series of four specimens of *Eleodes cognatus*, which plainly indicates that the latter is a species different

from *extricatus*, and that the fine punctures of the type are normal; these representatives show, however, that they are generally disposed in series which are alternately narrowly and slightly more widely spaced, the intervals being alternately flat and slightly convex, the sculpture in general greatly resembling that of *fusiformis*; the original type is not a perfectly characteristic example.

A few additional remarks concerning the species described in this and the preceding paper, based in great measure upon the material above mentioned, should be added as follows:—

The aggregation of fine punctures in widely distant longitudinal series, is a character common to all of our species of *Edrotes* except *nitidus*, in which I can find no trace of it; the aggregation of the punctures is generally evidenced by a certain indefinitely vittate appearance, amounting to well defined series in *ventricosus*. This, together with the fact that in the unique type of *globosus* I find the setæ are broken off in a remarkably even manner and that the pubescence in the normal state is really long and erect, necessitates a new arrangement of the species as follows:—

Elytral punctures extremely fine and sparse.

Each elytron with three narrow lines in which the punctures are more densely aggregated **ventricosus**

Elytra without trace of series; form more depressed..... **nitidus**

Elytral punctures coarse and deep, denser; each elytron with three broad ill-defined series, in which the interspaces between the larger punctures become distinctly, though finely, and rather sparsely punctate.

Elytra oval, slightly longer than wide; width of the prothorax scarcely more than one-half the elytral length; joints of the antennæ slightly more elongate..... **rotundus**

Elytra very globose, fully as wide as long, the width of the prothorax distinctly more than one-half the elytral length; elytral punctures rather less coarse and quite constantly sparser..... **globosus**

Triorophus lecontei differs from *nodiceps* in its more elongate form, less developed frontal umbo, much less transverse prothorax—the form of this part being nearly as in *lævis*—and in its coarser elytral punctures. It is however more closely related to *nodiceps* than to *lævis*.

Emmenastus acutus seems to vary greatly in the distinctness of the rows of punctures, some specimens before me having the series near the suture quite well developed. Under these circumstances it is proper to assign the Truckee specimen, referred to under *E. ater*, to *E. acutus*. *E. coarcticollis* has the head smaller, the prothorax

much shorter and more transverse, and the elytra polished throughout and not dull toward apex as is the case in *acutus*.

Asida angustula, of which I have now seen nine specimens, differs from *muricatula* in its constantly much narrower and more parallel form and shorter and sparser pubescence; the legs are, however, similarly clothed with short inclined setæ, and are devoid of long flying hairs.

Blapstinus californicus Mots. must be regarded as a manuscript name, the original description being completely inadequate for its recognition; it was probably taken in or near the western part of Texas.

V.

The small white object previously described (Col. Not. I, p. 196), has been further reported upon by Mr. Beaumont, who states that it is found in large numbers in all the nests of the termites, irrespective of species, and that it runs with such velocity as to be very difficult to capture, turning and jumping slightly off its feet with great facility, apparently by means of the fleshy abdominal appendage, of which it makes constant use.

These facts, in conjunction with its general organization, prove it to be a member of the order Thysanura, belonging to an undescribed genus, and constituting a family quite different from either the Lepismidæ, Campodidæ or Poduridæ. For the genus I would propose the name *GASTROTREUS*, and the species may be called *G. termilarius*.

The mandibles are short and very robust, the outer contour strongly, evenly arcuate, the apex abruptly produced and very finely acuminate. I cannot perceive any distinct internal denticulation.

EXPLANATION OF PLATE IV.

Fig. 1. Wing of *Blapstinus dilatatus*.

Fig. 2. Wing of *B. rufipes*.

Fig. 3. Wing of *B. niger*.

Fig. 4. Wing of *B. inquisitus*.

Fig. 5. Wing of *B. parallelus*.

Fig. 6. Wing of *B. pratensis*.

Fig. 7. Wing of *B. pimalis*.

Fig. 8. Wing of *B. pulverulentus*.

Fig. 9. Wing of *B. arenarius*.

Note.—The figures of the wings are drawn to the same scale throughout.

Fig. 10. Posterior femur of *Argoporis costipennis* ♂.

Fig. 11. Posterior femur of *A. alutacea* ♂.

Fig. 12. Posterior femur of *A. nitida* ♂.

Fig. 13. Posterior femur of *A. bicolor* ♂.

Fig. 14. Prothorax of *Tragosoma pilosicornis* ♀.

Fig. 14*a*. Elytral spine of same.

Fig. 15. Prothorax of *Tragosoma spiculum* ♂.

Note.—The spines at the sides are much too short and obtuse as drawn in the figure.

Fig. 15*a*. Elytral spine of same.

Fig. 16. Apex of the abdomen of *Ergates neomexicanus* ♂.

Fig. 17. Apex of the abdomen of *Ergates spiculatus* ♂.

VIII.—*Contributions to Invertebrate Palæontology.*

BY R. P. WHITFIELD.

Read October 13, 1890.

I. DESCRIPTIONS OF FOSSILS FROM THE PALÆOZOIC ROCKS OF OHIO.

In submitting for publication the following descriptions and observations of Ohio fossils I feel it due to myself to account for its detached and apparently incomplete character, to state that this arises from the fact, that it is essentially a report on certain groups of fossils submitted to me, partially for the purpose of ascertaining their horizons or for determining their relations to other beds the horizons of which were supposed to be already known. In the effort to carry out these objects, besides the specimens and information which I have received from Dr. Newberry, I have been aided by the loan of specimens and by other assistance from President Edward Orton, of the Ohio State University, and by the Hyatt Brothers, students in that institution, who have furnished me much information in regard to localities and horizons of different species, as well as lists of those known to occur in particular beds in the vicinity of Columbus; and also with specimens from their private collections. To the late Rev. E. B. Andrews, of Lancaster, Ohio, I am also indebted for the use of many of the specimens illustrating the Maxville limestones.

The fossils illustrated on Plate V, represent forms that are found exclusively in the hydraulic cement beds of the State, which represent the lower part of the Lower Helderberg and Waterlime groups of New York. The character of the fossils is such that no comments are necessary in regard to the horizon they represent. Plates VI to X inclusive, contain figures of species from the limestones below the horizon known as the "Bone bed" in the vicinity of Columbus, Ohio, and are to a great extent illustrations of heretofore undescribed forms. The forms represented on Plate XI are, with one exception, known species; they represent horizons not

hitherto recognized within the limits of the State, and require something more than a passing notice; I have therefore made some remarks upon them preceding their descriptions, more extended than would be convenient in this place.

The species illustrated on Plate XII are from the Huron and Erie Shales with one exception (*Aristozoe canadensis*) and the remarks preceding their description will sufficiently explain their grouping.

Those illustrated on the two following Plates, Nos. XIII and XIV, are all from the limestone layers known as the Maxville limestones, and although several are of previously undescribed species, enough of them are recognized forms to fully establish their geological horizon, which appears to be equivalent to the St. Louis and Chester beds of Illinois and the surrounding States. This conclusion, I believe, had been reached by Mr. F. B. Meek during his work on the Ohio fossils, at least his labels on some specimens of *Spirifera contracta* in the State Cabinet at Columbus would indicate this conclusion. The possibility of fully and satisfactorily identifying any of the divisions of the Lower Carboniferous formations of the more western States among the beds represented beneath the true Coal Measures of Ohio, must certainly be considered as an advantage in the study of these formations. Not only is this true from a stratigraphical point of view as enabling us to identify a stratum or formation over a much greater extent of country and thereby trace out and locate its history in time; but also palæontologically, as enabling us to satisfactorily identify many of the slightly varying forms of fossils represented in these beds with those from other localities, instead of having them described as distinct species, founded upon minute or imaginary differences resulting principally from a change in the state of preservation or of the conditions of life under which they may have existed during the deposition of the sediments in which they are now found. There seems to be a constantly growing tendency to describe as new species forms which vary in the slightest particular from the established species, and it often arises from the inability to satisfactorily identify the beds in which they are found with those from other localities where the stratigraphical relations are already known, and I cannot but regret that it is not practicable to work out the fossils of other of the Ohio formations, as I am fully persuaded there are several of these which could be positively identified with well-

known formations in other States, were this done. This is shown by the fossils from the red Iron-stone beds of the Waverly at Sciotoville, Ohio, among which are forms which indicate the Burlington or Burlington and Keokuk beds of Iowa and Illinois. On Plate 10, fig. 4 a-c, of Vol. II, Pal. Ohio, is represented a *Productus* in the condition of an internal cast, which when studied in numbers in connection with *Productus flemingi* var. *burlingtonensis* Hall, from Burlington, Iowa, and Quincy, Illinois, cannot fail to be identified as the same species, while the *Hemipronites crenistria* of the same plate scarcely differs from *Orthis keokuk* of the same beds; and on Plate 14 of the same volume, fig. 6, is already identified with the *Athyris lamellosa* of the Iowa locality. Although there may be many entirely new forms embraced within the vertical limits occupied by these same shells at the localities from which they are derived, I do not think this a sufficient reason why they should be considered as other than equivalents of the Burlington and Keokuk beds of the western States above mentioned.¹

Plate XV is occupied principally by new forms from the Coal Measures, while Plate XVI contains many previously described species. The smaller forms represented being mostly illustrations of species found in two separated layers of chert, within the limits of the Coal Measures, near Webb Summit and at Mrs. Banks's Farm, Falls Township, Hocking Co., which were particularly examined for determining their horizons, and the figured specimens were obtained from them in place. These species sufficiently mark their places as within the true coal bearing series.

For the interesting new forms illustrated on Plate X, I am indebted to H. Moores, Esqr., of Columbus, Ohio, and to Mr. Somers, of the same place, who have taken pains to collect and send to me for examination much of the well-developed fauna of Carbon Hill, Hocking Co., Ohio. On this same plate is represented a new genus and species of air breathing Mollusk, the discovery of which in the Coal Measures of Marietta, Ohio, is an exceedingly interesting fact, as showing the wide distribution over the American coal region during its formation, the conditions of climate and terrestrial circumstances which permitted the existence of this form of life to extend over Ohio, Indiana, and Nova Scotia.

¹ It may be well to state in this connection that these remarks were written in 1880.—R. P. W.

DESCRIPTIONS OF SPECIES.

SPECIES FROM THE HYDRAULIC LIMESTONES OF THE
LOWER HELDERBERG GROUP.

MOLLUSCOIDEA.

BRACHIOPODA.

Genus **STREPTORHYNCHUS** King.**Streptorhynchus hydraulicum.**

PLATE V, figs. 1-3.

Streptorhynchus hydraulicum Whitf., Ann. N. Y. Acad. Sci., 1882, p. 193.

Shell small to minute, the largest individuals yet observed not exceeding five-eighths of an inch in greatest diameter, while the most of those observed are not more than two-thirds as great. Valves depressed convex, or, more commonly, appearing very flat, as seen on the surface of the stone. Hinge-line straight, nearly as long as the width of the shell below, and the latter usually more than the length, frequently nearly once and a half as great. Ventral valve characterized by a very narrow and nearly vertical cardinal area, and a usually more or less twisted or otherwise distorted beak. Dorsal valve slightly more convex than the ventral, with a perceptible mesial depression extending from beak to base, becoming broad and undefined below the middle of the length. Surface of the shell marked by coarse and somewhat rigid radiating striæ, which are distinctly alternating in size; the principal ones proportionally very strong.

The small size of the shell, with the strong radiating and alternate striæ, are distinguishing features of the species. There is no species resembling it, to any degree, among the fossils of New York rocks of a corresponding age. It presents much more the features of forms of the genus from the Coal Measures than any heretofore described from Silurian rocks of America, and will not be readily confounded with any known species.

Formation and Locality.—In the hydraulic beds of the Lower Helderberg group, at Belleville, Sandusky County, and at Green-

field, Ohio; associated with *Meristella bella*, *Nucleospira rotundata* and *Leperditia alta*, occurring sometimes in great numbers, almost covering the surfaces of slabs.

Genus **SPIRIFERA** Sowerby.

Spirifera Vanuxemi.

PLATE V, figs. 4 and 5.

Orthis plicata Vanuxem, Geol. Rept. 3d Dist. N. Y., 1842, p. 112, fig. 1.

Spirifera Vanuxemi Hall. . .

The shells of this species are abundantly scattered over the surface of certain layers of the Waterlime rock, at Peach-Point, Put-in-Bay Island; associated with *Leperditia alta* of Conrad, and occur of all sizes from those of not more than an eighth of an inch in transverse diameter to those of about five-eighths of an inch, and present all the features of those of the Tentaculite limestone of eastern New York. The form is transversely oval in outline and convex in profile, on each side; the ventral being the most rotund; cardinal angles rounded and cardinal line short; ventral beak strongly incurved. The shell is marked on each side of the mesial fold or sinus by about four strong, rounded plications and are separated by concave spaces, which on the ventral valve appear of about equal width with the plications, but on the dorsal are narrower and somewhat sharper in the bottom. The mesial fold is fully twice as wide as the strongest plication, is somewhat regularly rounded or depressed convex, while the mesial sinus of the ventral valve appears narrower and deeply concave. The surface of the shell is marked by fine transverse or concentric striae which are strongly undulated in crossing the plications and fold, and under a magnifier are seen to present considerable regularity in size and arrangement.

The species presents many similarities to *S. crispus* Hisinger; as it occurs in the Niagara group of New York and other places in America, as well as to those of European localities. In fact it is quite difficult to see wherein they differ, but as the Lower Helderberg forms are nearly always found only as separated valves and more or less exfoliated, there is some difficulty in instituting satisfactory comparisons.

Formation and Locality.—In hydraulic limestone of the Lower Helderberg group, at Peach Point, Put-in-Bay, Lake Erie.

Genus **MERISTELLA** Hall.**Meristella lævis.**

PLATE V, figs. 6 and 7.

Atrypa lævis Vanuxem, 1842, Geol. Rept. 3d Dist. N. Y., p. 120, fig. 2.*Merista lævis* (Vanux.) Hall, 10th Rep. State Cab., p. 94.*Merista* (= *Meristella*) *lævis* (Vanux.) Hall, Pal. N. Y., vol. 3, p. 247, pl. 39, fig. 3.

Shell below a medium size, longitudinally ovate in form, and very ventricose; ventral valve much longer than the dorsal, with a strong incurved beak, from which the shell constantly widens to below the middle of the length; body of the valve flattened along the centre in the upper part, and gradually becoming more and more depressed until it becomes concave toward the front, forming a very distinct mesial sinus; front slightly prolonged and bent upward. Dorsal valve very convex in the upper part, approaching gibbous on the umbo, the beak small but strongly incurved; front of the valve truncate or slightly emarginate to accommodate the front extension of the ventral, but no distinctly defined mesial fold exists. Surface of the shell marked only by numerous concentric lines of growth, some of which are strongly defined.

The specimens of this species noticed from Ohio are smaller than the usual size of individuals from New York, but present the usual features of the species as shown on the specimens figured by Prof. Hall, on plate 39, Pal. N. Y., vol. 3, fig. 3, f and k, which is by far the most common and characteristic form among those from that State. The Ohio specimens are internal casts, and show the slit in the dorsal valve caused by the removal of the median septum very distinctly. The casts of the ventral side show the characteristic form of muscular impression, but it is small and faintly marked.

Formation and Locality.—In the hydraulic beds of the Lower Helderberg group, at Greenfield, Ohio.

Meristella bella.

PLATE V, figs. 8-10.

Merista bella Hall, 10th Rept. State Cab., 1857, p. 92.*Meristella bella* Hall, Pal. N. Y., vol. 3, p. 248, pl. xl, fig. 1.

Shell rather below a medium size, somewhat oblate in form, at least as wide as long, the narrowing of the beak giving an oblate appearance to the shell. Valves usually ventricose and sometimes highly convex, generally a little more full above than below the middle; margins of the shell regularly curved except near the beak, which is slightly projecting and moderately incurved. Surface of the valves smooth, but each characterized by a slightly impressed mesial sinus along the centre, more strongly marked on the ventral than on the dorsal side, and which not unfrequently causes an emargination of the front border of the shell.

The specimens of this species from Ohio are mostly in the conditions of internal casts, but a few among them retain the substance of the shell in the condition of a white chalky coating, sufficiently well preserved to afford material for description and illustration. They vary much among themselves in the form of the outline and in the degree of convexity of the valves, a few of them presenting a globular form, while others are but moderately convex. They sufficiently resemble the New York forms to be readily identified where the shell is retained, but in the condition of internal casts are not so easily recognized. The muscular imprints as seen on them are small and faint, those of the dorsal valve narrow and elongated, and that of the ventral is quite small, though deep, and is confined to the rostral portion of the valve.

Formation and Locality.—In a soft drab-colored hydraulic limestone referred to the Lower Helderberg group, at Greenfield, Ohio, associated with forms which appear to represent a *Nucleospira*.

Genus **NUCLEOSPIRA** Hall.

Nucleospira rotundata.

PLATE V, figs. 11-14.

Nucleospira rotundata Whitf., Ann. N. Y. Acad. Sci., 1882, p. 194.

Shell attaining a rather large size for the genus, being often more than half an inch in transverse diameter, and when of medium or large size, strongly ventricose or rotund. The younger individuals, however, are depressed-convex or lenticular in profile. Length of the shell as great or greater than the transverse diameter. Beaks small and incurved, not at all conspicuous. Valves marked by a slight depression along the median line, strongest on the ventral side.

This species, like all those of this formation yet obtained in Ohio, are mostly internal casts and impressions; consequently the true features of the shell are not readily obtained. The general features of the species, however, are preserved sufficiently for identification and comparison, when good individuals are selected. The shell bears much resemblance to *N. ventricosa*, Con., from the Lower Helderberg group of New York, in its general form, except the much greater size and more elongated form of the adult individuals. There is more difficulty in separating them satisfactorily from the casts of *Meristella bella* Hall, with which they are associated. In fact, it is all but impossible to do this with certainty, unless they are in a good state of preservation, as the difference in the form of

the muscular imprint of the ventral valve, and the more strongly incurved beaks, are the only features that can be relied upon.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group, at Greenfield, Ohio.

Genus **RETZIA** King.

Retzia formosa.

PLATE V, figs. 15 and 16.

Waldheimia formosa Hall, 10th Rep. State Cab., 1857, p. 88.

Trematospira formosa Hall, Pal. N. Y., vol. 3, p. 215, pl. 36, fig. 2.

Rhynchospira formosa Hall, Pal. N. Y., vol. 3, p. 485, pl. 95 A, figs. 7-11.

Shell small, the specimens observed not exceeding five-sixteenths of an inch in length, by about one-fourth of an inch or less in width; elongate-ovate in form, widest below the middle and narrowing at the beak on the ventral side, the apex being slightly incurved. Valves highly convex, with a slight depression along the middle. Surface of the shell marked by about twenty-two simple, round, radiating plications, two of which in the middle of the valves are more slender than the others and depressed below their level, forming a slight mesial sinus on each valve.

The shell, or rather the impression of the shell of this species as left in the rock, appears to represent an adult specimen, but is very much smaller than those of the Lower Helderberg group of New York, or those of *R. evax* in the Niagara group at Waldron, Indiana, but possesses all the essential specific characters of the species except in this one particular. The species as recognized in the Silurian rocks of Perry County, Tenn., resembles exactly this from Ohio, both in size and general characters. It has proven hitherto quite rare, but might possibly be found in greater abundance were it sought for; the specimens noticed occurring on blocks of stone selected for other fossils.

Formation and Locality.—Lower Helderberg group (Waterlime beds), at Greenfield, Ohio.

Genus **RHYNCHONELLA** Fischer.

Rhynchonella hydraulica.

PLATE V, fig. 17.

Rhynchonella hydraulica Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 194.

Shell rather smaller than medium size, transversely oval in outline and ventricose in profile; the dorsal valve being highly convex, and the ventral somewhat depressed convex. Beaks small, not prominent or conspicuous;

that of the ventral valve moderately incurved, and the other rather strongly incurved. Surface of the shell marked by from sixteen to eighteen simple plications, four of which are strongly elevated on the front half of the dorsal valve to form the mesial elevation, which does not extend beyond the middle of the valve, and six or seven may be counted on each side of the valve. The plications are but slightly elevated, are round on the summit, and do not extend beyond the middle of the shell, the upper part of which is smooth, and marked only by concentric lines of growth. The interior of the dorsal valve is marked by a moderately strong mesial septum, extending from the apex of the valve to about one-third of its length. The shell appears to have been also marked by fine concentric lines of growth, some of which form distinct varices.

This species belongs to the semi-plicated group of the genus, of which there are many species having close resemblance to it, but none in rocks of corresponding age or position having very close affinities.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group, at Greenfield, Ohio.

Genus **PENTAMERUS** Sowerby.

Pentamerus pes-ovis.

PLATE V, figs. 11–22.

Pentamerus pes-ovis Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 195.

Shell quite small, and of a somewhat broadly triangular form, with depressed convex valves, the ventral side being nearly twice as deep as the dorsal, and more elongated at the beak, giving it the triangular character; cardinal slopes straightened and rapidly diverging; front broadly rounded.

The species is known only in the condition of internal casts, and as thus seen, the ventral valve is deeply cleft along the median line by the removal of the central septum, the slit often extending more than three-fourths of the length of the valve. The filling of the spoon-shaped cavity is proportionally large, being long and narrow, and not strongly arched. Cast of the dorsal valve characterized by a proportionally large and broad cardinal plate, from which project two long and strongly divergent and distant crural processes, reaching far along the surface of the cast in some cases, while in others they are quite short. The surface of the valves has been destitute of plications, but is usually marked in the larger individuals by several strong varices of growth near the front margin, which give to the shell a prematurely old appearance for so small a species; the individuals seldom exceed five-eighths of an inch in length on the ventral side.

The species is unlike any known form of a similar size, in the shallowness of the valves, in the erect character of the ventral beak,

and in the deeply divided feature of the cast of this valve. The dorsal valve is much less marked, and is often destitute of any distinguishing feature.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group, in Adams County, Ohio, occurring in numbers densely packed together, but having the shelly substance entirely removed.

MOLLUSCA.

LAMELLIBRANCHIATA.

Genus **PTERINEA** Goldfuss.

Pterinea aviculoidea.

PLATE V, fig. 23.

Megambonia aviculoidea Hall, Pal. N. Y., vol. 3, p. 274, pl. 49, figs. 7 and 8.

Pterinea ariculoidea (Hall) Whitf., Geol. Rept. Wis., vol. iv, p. 322, pl. 25, figs. 6-7.

Shell of proportionally small size, obliquely rhomboidal in outline, with a moderately long, straight hinge-line, but little shorter than the length of the body of the shell below. Left valve depressed convex, with a small, slightly incurved beak, scarcely extending above the cardinal line. Anterior end short, and the anterior projection scarcely defined; posterior wing concave and the posterior margin nearly at right angles to the hinge-line for a short distance below, then gently curving backward to the rounded postero-basal extremity; basal line rounded and on the anterior side of the umbonal ridge curving rapidly upward to the anterior extremity. Body of the valve convex and oblique to the hinge, the umbonal ridge broadly rounded. Surface of the shell marked only by lines of growth some of which are stronger and form slight varices.

The species is poorly represented in individuals, but the specimens seen are so precisely like those of the Tentaculite limestones of New York as to be not readily mistaken.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group on Put-in-Bay Island, Lake Erie.

Genus **GONIOPHORA** Phillips.

Goniophora dubia.

PLATE V, figs. 24-26.

Modiolopsis? dubius Hall, Pal. N. Y., vol. 3, p. 264, pl. 49, fig. 2.

Shell small, transversely elongate, nearly twice and a half as long as high. Valves ventricose, most highly convex on the anterior half, becoming more depressed toward the posterior; beaks small, very slightly incurved but not

elevated above the cardinal border and rather inconspicuous, situated about half or rather less than half the height of the shell from the anterior extremity, proportionally more distant on the larger specimens than on those of small size. Hinge-line long and straight, extending four-fifths of the length of the shell behind the beaks and characterized by a narrow but distinct escutcheon. Anterior end short and full, very obtusely pointed at the longest part, which is at about the middle of the height, above which point there is a very distinct but narrow lunule extending to the extremity of the hinge-line. Basal margin of the valve very broadly curved, slightly emarginate just anterior to the middle and the whole subparallel to the cardinal line. Posterior extremity sharply rounded below and the upper margin very obliquely truncated; body of the valve marked by a broad, distinct, mesial sulcus extending from behind the beak to the broad sinus of the basal margin. The umbonal ridge is rather sharply marked and angular in the upper portion, but becomes less distinctly marked posteriorly; postero-cardinal slope of moderate width, very slightly concave in the younger stages of growth but less strongly marked as the growth advances. Surface of the valves marked by strong, sublamellose, concentric lines of growth parallel to the outer margin of the valves.

The shell undergoes considerable change in form and in the strength of the surface characters between the younger and more advanced stages of growth; the sharpness of the features being much reduced on the older portions, by the rounding of the umbonal ridge and of the angularity of both the anterior and posterior extremities of the shell. The shell differs in several of its external features from the genus *Modiolopsis*, possessing a distinct lunule and escutcheon as well as the angular umbonal ridge, in all of which features it corresponds with *Goniophora*.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group at Peach Point, Put-in-Bay Island, Lake Erie, and at Middletown, Marion Co., Ohio.

ARTICULATA.

CRUSTACEA.

MEROSTOMATA.

Genus **EURYPTERUS** DeKay.

Eurypterus Eriensis.

PLATE V, figs. 31, 32.

Eurypterus Eriensis Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 196.

Among the fossils from the hydraulic limestones of Peach Point, Put-in-Bay Island, Lake Erie, there are several detached cephalic

shields and one body of a species of *Eurypterus*, which is so distinctly different from any of those described, that it seems necessary to class it as a separate species. The differences, so far as seen on the parts preserved, consist in the form of the cephalic plate, in the size and position of the eye-tubercles, and in the proportions of the body as compared with the known forms. There are undoubtedly other and more important differences in the appendages, but as these are not preserved on any of the individuals examined, comparison is impossible.

The cephalic shield is proportionally broader than that of *E. remipes* or *E. lacustris*, and is more regularly rounded or arched on the anterior border, lacking that subquadrate form characteristic of those species. The eyes are proportionally smaller, and situated nearer each other, and also farther forward, as well as being somewhat more oblique to the longitudinal axis of the body. The minute ocular points are somewhat larger than in *E. remipes*, are situated close together, and are nearly opposite the posterior end of the real eye-tubercles; they consist of a pair of distinctly elevated rings surrounding rather deep, although minute, central depressions; the inner margins of the rings being almost in contact. The head does not show evidence of having been margined by an elevated or thickened rim, as in those species, but as the specimens are rather impressions of the inner surface of the external crust than actual external surfaces (being more properly internal casts, the substance of the carapace having been entirely removed), this feature may not be properly shown. The head-plate more closely resembles that of *E. microphthalmus* Hall (Pal. N. Y., vol. iii, p. 407,* pl. 80 A, fig. 7), from the Tentaculite limestone near Cazenovia, N. Y., than of any other described species; it differs, however, in being proportionately much shorter, which gives it a more semicircular form. The eye-tubercles are also more nearly of the size of those of that species and similarly situated.

The thorax closely resembles that of *E. remipes* in its general form, but the lower three or four segments are proportionally shorter, giving the posterior extremity a much more compact character. The principal distinction between the two species, as shown by the thorax, exists in a difference of the ornamentation of the surface, as seen on the specimen used. This consists in the minute spine-like pustules or pointed granules, marking the surface of the crust, being arranged in irregular transverse lines across the body,

and parallel to the anterior and posterior margins of the segments, instead of being irregularly disposed, as in all other species described. No indication of the longitudinal rows of larger pustules, marking the median line of the thoracic segments, can be traced. Caudal spine not observed.

OSTRACODA.

Genus **LEPERDITIA** Ronault.

Leperditia alta.

PLATE V, fig. 27.

Cytherina alta (Con.) Vanuxem, Geol. Rept., 3d Dist. N. Y., 1843, p. 112, fig. 6.
Leperditia alta (Conrad) Jones, Ann. and Mag. Nat. Hist., vol. 17, 2d series, p. 88; Hall, Pal. N. Y., vol. 3, p. 373; Meek, Pal. Ohio, vol. 1, p. 187, pl. 17, fig. 2.

Valves of the carapace transversely sub-ovate, widest posterior to the middle and narrowed in front, the proportional height and length being somewhat variable, but are usually about as two and three. Hinge-line straight nearly two-thirds as long as the entire valve, extremities salient. Anterior end of the valves narrowly rounded and the posterior extremity broadly curved; basal-line curved but with a scarcely perceptible angularity just posterior to the middle of the length. Surface prominently convex and a little the fullest anterior to the middle; ocular tubercle small, situated a little below and just behind the anterior extremity of the hinge-line. Lower margin of the valves slightly inflected, and in some cases the posterior margin appears to have been bordered by a slightly thickened rim.

The individuals examined are either internal casts or impressions of the exterior, owing to which fact the finer surface features of the crust cannot be definitely ascertained; enough is seen however to show its identity with those from the Tentaculite limestones of New York. The species as described by Mr. F. B. Meek includes this and the following one, which are very distinct species, the differences being very strongly marked in the great prominence of the lower part of the valves of that one, and its strongly sub-angular form as well as in its greater size. The principal variation noticed among the individuals of this species, is in the greater proportional length of some of them, producing a cylindrical form. This feature is however seen occasionally among those from Schohaire, N. Y., but does not appear to be worthy of specific consideration.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group, at Belleville, Sandusky Co., Ohio.

Leperditia angulifera.

PLATE V, figs. 28-30.

Leperditia angulifera Whitf., Ann. N. Y. Acad. Sci., March, 1882, 196.

Carapace of medium size, having a length, in adult individuals, of about three-eighths of an inch, by a height of one-fourth of an inch in the broadest part. General form of the outline broadly sub-ovate and widest posteriorly; hinge-line straight, equal in length to two-thirds that of the entire valve; anterior end a little the shortest, narrowly rounding into the broadly curved basal line; posterior end broadly rounded. Surface of the carapace highly elevated and prominent, forming a strong, somewhat angular, longitudinal node just within the basal margin, and near the middle of the length. From this point, the surface slopes somewhat gradually upward to the hinge-line, with a barely perceptible convexity, except on the anterior end, where it is more strongly convex, and characterized by a rather prominent and well-marked ocular tubercle. From the angular node near the lower margin, there is, on well-preserved individuals, a perceptible angulation, extending along the surface to the point of greatest length on the anterior end, and a similar one, but less strongly marked, on the posterior side. There is no perceptible difference in form between the right and left valves, each showing the features about equally developed. No appearance of striations radiating from the ocular tubercle can be detected, either on the internal casts or in the matrices; still the nature of the rock in which they are imbedded is such that very obscure markings would scarcely be preserved.

This species differs from *Leperditia alta* Conrad, of the same formation, in its larger size, and in the larger and more distinct eye-tubercle, as well as in its slightly different position; but most distinctly in the sub-angular ridge-like node, and greater convexity of the lower border of the valves. This projecting node being situated near the lower margin, and also being the most prominent point of the valve, causes the rock to adhere to the more abrupt sides when fractured, and gives to the valves as they appear upon the fractured surface a very decidedly triangular aspect, entirely unknown in *L. alta*.

Formation and Locality.—In the hydraulic limestone of the Lower Helderberg group, at Greenfield, Ohio, where it occurs in great numbers, forming distinct layers through the rock, as does the *L. alta* in the Tentaculite limestone of New York.

SPECIES FROM THE LIMESTONES OF THE UPPER
HELDERBERG GROUP.

PROTOZOA.

Genus **RECEPTACULITES** DeFrance.**Receptaculites devonicus.**

PLATE VI, fig. 10.

Receptaculites devonicus Whitf., An. N. Y. Acad. Sci., March, 1882, p. 198.

A very decidedly marked and characteristic specimen of the genus *Receptaculites*, DeFrance, has been obtained from the limestones of the Upper Helderberg group, by Mr. Ed. Hyatt, of the Ohio State University, from a quarry at Fishinger's mills, about eleven miles north of Columbus, Ohio. The specimen is about two and a half inches in diameter, is broadly concave across the disk, and slightly recurved at the outer margin. The concentric lines of pores or cells are strongly marked, and increase rapidly in size as they recede from the centre of the disk, but the surface has been so much weathered that the grooves left by the removal of the stolons at the foot of the cells are not distinguishable, so that the entire specific characters are not recognized; enough, however, remains to show the general form and proportions. It has much the appearance of specimens of a corresponding size of *R. Oweni* Hall, from the lead-bearing limestones of the West, both in its general form and in the concavity of the disk, as well as in the proportions and rate of increase of the cell-openings as seen exposed on the surface of the limestone.

The occurrence of a species of this genus at this horizon, is a rather unexpected feature in its history. The highest horizon of its occurrence hitherto recorded, is in the shaly limestone of the Lower Helderberg group of New York, from which the type of the species *Receptaculites infundibuliformis* (*Coscium infundibuliformis* Eaton, Geol. Text-book, 2d ed., 1833, p. 132, fol. 5, figs. 64, 65) was derived. The figure and description, as given by Prof. Eaton, are both poor, but the specimen is still in the cabinet of the

Rensselaer Polytechnic Institute, bearing the original label, and I have seen several specimens of the species from the same formation. *R. dactyloides* (*Dictyocrinus dactyloides* Conrad) is also from about the same horizon. Both of these species, however, are in the Silurian, while the present species brings the genus up to the Devonian; so that we now know of its existence from the base of the Lower Silurian to the Lower Devonian.

RADIATA.

Genus **STYLASTREA** Lonsdale.

Stylastrea Anna.

PLATE VI, figs. 1-5.

*Stylastrea Anna*¹ Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 199.

Corallum compound, growing in irregular or more or less hemispherical masses of several inches in diameter, which are formed of a large number of closely aggregated polygonal cell tubes or polyps, of rather small size, divided by intercellular walls of considerable thickness, as in most forms of the compound *Cyathophyllideæ*. Full-grown polyps, measuring about half an inch in diameter, but usually somewhat smaller; the prevailing size being about three-eighths of an inch. Calyces deep, abruptly declining from the intercellular walls to a depth nearly equalling the transverse diameter. Longitudinal septa or rays well developed, extending about one-third, or less of the diameter of the tube from the outer wall, and averaging about forty in number in adult individuals; some containing thirty-six, and one large one counted gives forty-two. Crest of the rays strongly denticulate, the denticles being thickened and knot-like at their junction with the rays. Central chamber within the limits of the longitudinal rays, equal to one-third of the entire diameter of the polyp, and divided by numerous distinct transverse tabulæ, which are variously bent or interrupted by contact with the adjoining ones, leaving irregular cavities of considerable size between them. Interseptal spaces occupied by a series of horizontal plates, which originate at the outer wall, and extend upward and inward with increased growth to the edge of the rays, where they form the denticulation of the crest. Between the latter plates, the spaces are occupied by the smaller irregular vesicular structure.

The species, in its general features, resembles *Cyathophyllum rugosum* Hall, sp., from this formation, and may be easily mistaken for that one, in obscure or imperfect specimens; but where the internal structure is observable, especially in longitudinal sections of the polyps, can be very readily distinguished by the large central

¹ Named in honor of Mrs. Orton, wife of President Edward Orton, of the State University, Columbus, Ohio.

space in each polyp, and by the strongly developed transverse tabulæ; also by the rays not extending to the centre, as in that species and in those of the genus *Acerularia*. When the coral is weathered, or the substance becomes chalky, so that the polyps are readily separable from each other longitudinally, the appearance very closely resembles that of *Cyathophyllum rugosum* when in a similar condition, but the interruption of the rays before reaching the centre, and the great extent of the tabulæ, will then serve to distinguish them.

Formation and Locality.—In the Upper Helderberg group, in Paulding County, Ohio.

MOLLUSCOIDEA.

BRACHIOPODA.

Genus **STREPTORHYNCHUS** King.

***Streptorhynchus flabellum*.**

PLATE VI, figs. 7 and 9.

Streptorhynchus flabellum Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 200.

Shell below a medium size, semi-circular or semi-ovate in outline, with a straight hinge-line of variable length; the lateral and front margins are somewhat regularly rounded and, in a profile view, irregularly bi-convex. Ventral valve depressed convex, with a more or less elevated and projecting but twisted or distorted beak, overhanging a nearly vertical cardinal area of irregular form and width, which is divided in the middle by a narrowly triangular convex deltidium. The dorsal valve is almost regularly semi-circular, very depressed convex, with a slightly more prominent umbo, and is destitute of cardinal area. Surface of the valves marked by from twenty-two to twenty-four strong, rather sharply elevated, radiating plications, which are entirely simple, and separated by broad, concave interspaces. The shell is also further marked by fine, regular, concentric striae of growth, which arch backward in crossing the radii, and may have been sub-lamellose on the external surface, but the examples seen are all exfoliated.

The species is of a somewhat unusual type, especially in Devonian rocks. The dorsal valve seen alone presents so much the appearance of a strongly-marked *Aviculopecten*, that when first observed it was thought to belong to that genus; but the ventral valve, similarly marked, and possessing the characteristically twisted cardinal area and beak with its covered fissure, at once indicates its true position. It is entirely unlike any species hitherto described

from American rocks, and will not easily be mistaken. It resembles, in the features of the dorsal valve, specimens of *Orthis flabellum* from the shales of the Niagara group of New York and elsewhere; but it is more coarsely marked, with wider and more deeply concave interspaces.

Formation and Locality.—In the limestone of the Upper Helderberg group, at Smith and Price's quarries, near Columbus, Ohio. Collected by Mr. Hyatt.

Genus **RHYNCHONELLA** Fischer.

Rhynchonella? raricosta.

PLATE VI, fig. 6.

Rhynchonella raricosta Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 201.

Shell of moderate size, and somewhat transversely sub-triangular in outline, when seen upon the ventral side. Ventral valve flattened and very shallow, with a short, obtuse, and not at all incurved beak; cardinal slopes incurved, and the margins straight from the beak to near the point of greatest width of the valve, the angle of divergence being nearly or quite 120 degrees. Front of the valve broadly curved, and marked by several deep indentations corresponding to the number of plications marking the surface. Middle of the valve marked by a broad, shallow, slightly angular mesial sinus, which is more than one-third as wide at the front of the valve as the length from beak to base. Surface of the valve marked, on each side of the sinus, by two low, angular, but distinct plications, besides those bordering the sinus; no other markings are traceable on the surface of the shell. The margin of the valve between the plications is extended, forming rounded projections similar to that of the mesial sinus, and probably corresponding to low rounded plications which have characterized the dorsal valve, which has not been observed.

The broad sub-triangular form of the shell, with the shallow ventral valve and the small number of low, angular plications, will readily distinguish this from any species hitherto known. There may possibly be some doubt as to the generic reference of the species; but this cannot be positively determined until more perfect individuals are obtained.

Formation and Locality.—In limestone of the Upper Helderberg group, at Smith and Price's quarries, near Columbus, Ohio. Collected by the Hyatt brothers, of the State University.

MOLLUSCA.

LAMELLIBRANCHIATA.

Genus **MYTILARCA** H. and W.

Prelim. Notice Lamellibranchiate Shells, Up. Held., Ham. and Chemung Groups, etc.
State Cab. Nat. Hist., Dec. 1869.

Mytilarca percarinata.

PLATE X, figs. 1 and 2.

Mytilarca percarinata Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 202.

Shell less than medium size, the specimen used for description and illustration measuring but one and three-fourths inches in extreme height; and the distance from the anterior to the posterior margins across the point of greatest diameter, only a trifle over one inch; the depth of the valve being nearly half an inch. Form of the shell elongate triangular-ovate, rather acutely pointed at the beak, which is small and incurved; anterior, or byssal, margin straight and absolutely vertical in the example mentioned; basal margin broadly rounded from the anterior line nearly to the point of greatest length of the valve, where it is more rapidly curved, and finally passes abruptly into the rapidly ascending posterior margin; the lower part of which is nearly parallel to the anterior side, but above inclines more rapidly toward the short and very oblique hinge-line. The surface of the valve is most elevated along the anterior umbonal ridge, where it is at right angles to the anterior surface, but slopes gently backward for two-thirds of the distance toward the posterior margin, and on the other third much more abruptly. Near the beak, the surface rounds rapidly from the anterior ridge to the posterior border. Surface of the shell marked by numerous concentric ridges, parallel to the margin of the valve, many of which are strongly marked and form varices of growth. On the anterior surface, these varices and the concentric striæ are well marked. Cardinal area not observed.

The example used is a right valve, and bears evidence in its characters of being an adult shell. It is associated in the same layers of cherty material with *M. ponderosa*, H. & W. (*Prelim. Notice Lamell. Shells, etc.*, p. 21), but may be readily distinguished by the vertical anterior surface and the angular umbonal ridge. From the young of that species, it is readily distinguished by these characters, as those are distinctly round and ventricose. The only known species approaching this in the angularity of the ridge, is *M. attenuata*, H. & W., of the Chemung group; but this is quite distinct in other respects.

Formation and Locality.—In the white chalky chert-beds of the Upper Helderberg Group, near Dublin, Ohio.

GASTEROPODA.

Genus **PLATYCERAS** Conrad.**Platyceras squalodens.**

PLATE VII, figs. 6 and 8.

Platyceras squalodens Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 202.

Shell small, sharply conical when viewed in a lateral direction, with the apex gently curved anteriorly; but in a posterior view, the form is narrowly lanceolate, with the dorsal portion rising into a thin, sharp crest or ridge; anterior side rounded and the anterior slope concave. Aperture narrowly ovate, rounded on the anterior side, widest just above the middle, and extending backward into a narrow point. Surface of the shell marked by fine, hair-like, concentric lines of growth parallel to the margin of the aperture, which is a little bent down anteriorly and posteriorly, and also by a rather faintly marked, but still distinct sulcus, which passes from the apex on the left anterior slope, and over which the striæ are slightly undulated, indicating a slight notch in the margin at this point.

In the narrow and curved lanceolate form of the shell, this species differs very materially from any of the numerous species of this very monotonous genus, and may be readily distinguished by the sharp dorsal ridge.

Formation and Locality.—In the Upper Helderberg limestone, at Columbus, Ohio. Collection of Columbia College.

Genus **DENTALIUM** Linneus.**Dentalium Martini.**

PLATE VII, fig. 10.

Dentalium Martini Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 203.

Shell somewhat larger than medium size, rather rapidly expanding from the apex to the aperture for a species of this genus, and moderately curving throughout the length; cylindrico-conical in form, and circular in a transverse section. Surface marked only by encircling striæ, which form rather broad undulations on the shell, and are strongly arched forward on the inner side of the curvature, showing that the lip of the shell has been somewhat extended on this side of the aperture. Shell-substance thick.

The species attains a rather large size, and expands more rapidly than most species of the genus, reaching a diameter of one-fourth of an inch in a length of less than two inches. The curvature is also considerable, being deflected fully an eighth of an inch from a straight line within the length of the specimen when tested on the

inner face. There is no species of similar character from rocks of Devonian age, so far as can be ascertained. On some of the internal casts, there occurs a longitudinal ridge, as if there had been a slit or interruption of some kind at that point, which gives rise to a supposition that it may have belonged to the genus *Coleoprion* Sandberger, though no positive interruption of the striæ of the surface is seen on any specimen examined. This fact may suggest its belonging to the recently formed genus *Coleolus* Hall; but its perfect resemblance to *Dentalium* more strongly indicates its affinities as in that relation, rather than with the Pteropoda. Nor does there appear any sufficient reason among the species referred to *Coleolus* by its author, for a generic separation from *Dentalium*, other than their more strictly straight form. But there are straight or nearly straight *Dentalia*, and also curved forms which he has referred to the new genus. The generic feature "shells thick" would also be opposed to pteropodous affinities. In its more rapid taper and greater curvature, it is sufficiently distinct from described forms of that genus.

Formation and Locality—In the cherty layers of the Upper Helderberg limestones, near Dublin, Ohio.

Genus **MACROCHEILUS** Phillips.

Macrocheilus priscus.

PLATE VII, figs. 3 and 4.

Macrocheilus priscus Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 204.

Shell small and very ventricose, the height but little greater than the diameter of the body volution; the former in the figured example being three-eighths of an inch, and the latter only about one-sixteenth of an inch less. Shell composed of about four volutions, which are very ventricose and rapidly increase in diameter, the last one forming the great bulk of the shell, equalling fully two-thirds of the entire height. Suture-line distinct, but not strongly marked. Apical angle about eighty degrees. Aperture somewhat semilunate, strongly modified on the inner side by the body of the preceding volution, which occupies fully one-half its height. Columella strong, straight and rounded, and the twisted ridge obsolete. Surface of the shell apparently smooth; at least no striæ are perceptible.

This pretty little species reminds one strongly of *M. ventricosus* Hall, from the Coal-measures, but is somewhat shorter in the spire, although resembling it in most other respects. The substance of the shell is soft and chalky, and might not retain minute surface

striæ if they had ever existed; but no remains of them are visible at present.

Formation and Locality.—In the white cherty layers of the Upper Helderberg group, near Dublin, Ohio.

Genus **LOXONEMA** Phillips.

Loxonema parvulum.

PLATE VII, fig. 5.

Loxonema parvulum Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 204.

Shell minute, scarcely exceeding a fourth of an inch in length, and proportionally slender, with a rapidly ascending spire, which is slightly more rapidly tapering in the upper than in the lower part. Volutions six or six and a half, moderately convex on the outer surface, and more strongly rounded on the lower part of the exposed portion than on the upper; suture-line distinct, but not margined by a flattening of the upper edge of the succeeding volution. Aperture elongate, slightly angular at the base, and pointed above. Surface of the volutions marked by a large number of distinct vertical striæ, which are more numerous and slightly finer on the body volution than above, and are so nearly destitute of sigmoid curvature as to appear vertical until closely examined.

The small size of the shell, the nearly vertical lines, and the unequally expanding volutions, are distinguishing features; the latter character, however, appears to vary a little in degree on some of the specimens. It will be readily distinguished from the young shells of *L. Hamiltoniæ*, which occurs in the same rock, by the number of volutions and the slender form.

Formation and Locality.—In the white cherty layers of the Upper Helderberg limestone, near Dublin, Ohio.

CEPHALOPODA.

Genus **ORTHOCERAS** Breyn.

Orthoceras nuntium.

PLATE VII, figs. 1 and 2.

Orthoceras nuntium Hall, 15th Rept. State Cab., p. 79, pl. 8, figs. 3 and 4. Pal. N. Y., Illust. Dev. Foss., p. 43, figs. 4 and 15.

Comp. *O. subulatum* Hall, Geol. Rept. 4th Dist. N. Y., p. 180, fig., and Pal. N. Y. Illust. Dev. Foss., pl. 38; also *O. Thoas* and *O. Hyas* Hall, of same work.

Shell attaining considerable size, the specimen used for description and figured having a length of nine inches, and still imperfect at both extremities, retains only about an inch of the outer chamber, and has a diameter of half

an inch at the lower extremity. Section circular; tube moderately increasing in diameter with increased length, slightly curved throughout, and marked by regular encircling annulations, which are elevated, round on the crest, separated by deeply concave interspaces, which regularly increase in distance and also in strength from below upwards. Those of the lower part where the shell is uncompressed and is half an inch in diameter, are about one-tenth of an inch distant from each other; and at the upper end where the diameter is about one and three-fourths of an inch are about three-eighths of an inch from crest to crest. Surface of the shell marked by fine, closely arranged and sharply elevated concentric striæ, and also by longitudinal striæ of similar character, but more or less alternating in strength, the two sets giving a finely cancellated structure just discernable to the unassisted eye. Septa very deeply concave and regularly curved, uniting with the shell a little above the crest of each annulation. Siphuncle small and centrally situated.

The species is of the ordinary annulated type differing from other species of the group only in the strength and comparative distance of the annulations; in the rate of increase in diameter, and in the nature of the surface markings. The shell, like many of the annulated forms of any considerable size from the Upper Helderberg and Hamilton groups, shows a slight curvature of the tube, a little more perceptible in the lower part than above. The Ohio specimens correspond more nearly to the one from the Hamilton group of N. Y., figured by Prof. Hall (Pal. N. Y., Illust. Dev. Foss., Pl. 43, fig. 14), in the rate of increase in the diameter, and in the form and relative strength of the annulations than with the original specimens to which the name was first applied, or to most of those figured under the same name on the same plate. The specimen from Ohio figured on Pl. 41, fig. 9, Illust. Dev. Foss., Pal. N. Y., under the name *O. Thoas*, is identical with the one here described, but does not retain the shell nor show surface markings, but corresponds in the form of the annulations and in its slight curvature and rate of increase in diameter, in which particulars it differs materially from those from New York, given on the same plate. It is barely possible the Ohio specimens may represent a species distinct from any of those from New York, but it seems totally impossible to detect characters sufficient to distinguish it as such. *O. subulatum* Hall, from the Marcellus shell is a very closely allied if not identical form.

Formation and Locality.—In the cherty layers of the Upper Helderberg group, near Dublin; and in the limestone of the same formation near Delaware and Columbus, Ohio.

CEPHALOPODA.

Genus **TREMATOCERAS** Whitf.

Ann. N. Y. Acad. Sci., March, 1882, p. 205.

A straight, obconical, cephalopodous shell, presenting the characteristics of an *Orthoceras*, so far as the appearance of the tube, septa and siphuncle is concerned; but with the additional feature of a line of elongated, raised tubercles along one side of the shell, which have formed perforations at certain stages of growth, probably confined to the outer chamber as openings, which were closed as the animal extended the shell, and before the septa opposite them were formed. Type, *T. Ohioense*.

The shell for which the above generic name is proposed offers an entirely novel feature among the Orthoceratidæ. The line of nodes seen on the cast of the shell is entirely different from anything pertaining to the ornamentation of the shell, and presents the same appearance as would the partially filled perforations of a *Haliotis*, or like those shown on the back of species of *Bucania*, and those on which the genus *Tremanotus* was founded; neither is it a feature at all dependent upon the position of the siphon or directly connected with it; for in the specimen used the siphon is slightly excentric, on the opposite side of the tube from the nodes. Its position would thus indicate that it was a feature pertaining to the dorsal lip of the shell, corresponding to the sinus seen in the lip of many other genera. Taking this view of it, it would appear to indicate the existence of a deep, narrow notch, with raised margins, in the lip of the shell at stated periods, beyond which the shell was again united for a time, leaving a perforation to be closed by a deposit of shell from the mantle as it approached the lower part of the chamber of habitation. Many species of *Orthoceras* have been observed, having a raised line, or rather markings, along the dorsal side; but none, so far as I am aware, presenting these evidences of a series of separate openings, which I consider a feature worthy of generic distinction.

Trematoceras Ohioense.

PLATE X, figs. 3 and 4.

Trematospira Ohioense Whitf., Ann. N. Y. Sci., March, 1882, p. 206.

Shell of medium size, straight, and somewhat rapidly tapering from below upward; the rate of increase being equal to nearly one-sixth of the increase in length. Septa moderately concave, rather closely arranged; five of the

chambers about equalling the diameter of the uppermost of the five counted. Siphon of moderate size, and in the specimen used slightly excentric. The surface of the shell, so far as can be determined from the internal cast, has been smooth. Perforations, or nodes representing them, large and elevated, two to three times as long as wide, and occurring at every third septum below, and at every second in the upper part of the specimen.

Formation and Locality.—In limestone of the Upper Helderberg group, at Smith and Price's quarry, near Columbus, Ohio. The discovery and preservation of this peculiar specimen are due to the careful observation of Mr. Edward Hyatt, of the State University, at Columbus, Ohio.

Genus **GOMPHOCERAS** Sowerby.

Gomphoceras Hyatti.

PLATE VIII, fig. 1, and PLATE V, fig. 1.

Gomphoceras Hyatti Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 206.

Shell large and robust, slightly arcuate throughout, but more strongly curved below than in the upper part; somewhat rapidly expanding from below upward to near the middle of the outer chamber, where it is suddenly contracted to the aperture, and on the lateral margins again slightly expanding. The rate of increase in diameter, as compared with the increased length, is about as one and two, when measured on the inside curvature. Transverse section of the shell obtusely subtriangular, flattened or but slightly convex on the inner surface, rounded on the lateral surfaces, and obtusely rounded on the back; the dorso-ventral and lateral diameters are about as four and five, and the triangular form is more perceptible in the earlier stages of growth, owing to the greater convexity of the inner face in the upper portion and on the outer chamber. Outer chamber comparatively short, being about two-thirds as high as wide. Aperture large, irregularly tri-lobed, straight on the inner face, and about four-fifths as wide as the entire width of the shell, and apparently about two-thirds as wide in a dorso-ventral direction as laterally. The exact form of the aperture on the outer side cannot be ascertained, owing to the imperfection of the specimen in this part. Septa moderately concave, very closely arranged in the lower part, but more distantly disposed above; the rate of increase in distance somewhat gradual to near the upper portion, where two or three of the septa are slightly more crowded. In the more distant portions, three chambers occupy the space of one inch, but in the lower part of the specimen, where the transverse diameter is a little more than one and a half inches, they are less than one-twelfth of an inch apart. Siphuncle of moderate size and sub-centrally situated. Surface of the shell unknown.

The specimen from which the description is taken is an internal cast, not retaining any portion of the shelly structure; but it ap-

pears to have been destitute of strong surface markings. It measures about seven inches in length by nearly four inches in transverse diameter at the widest part, which is near the lower part of the outer chamber. The lower end is imperfect, and measures one and a half inches in transverse diameter. It is with some hesitation that I place the species under the genus *Gomphoceras*, owing to the strong curvature of the shell and the structure of the aperture, which is reversed in its relation to the curvature of the shell as compared with most species of the genus; the widest portion being on the inside curvature, instead of on the outer side. The general triangular or trilobed form of the aperture, together with the greater lateral diameter, would seem to overbalance the fact of the curvature.

Formation and Locality.—In limestone of the Upper Helderberg group, at Smith and Price's quarries, near Columbus, Ohio. Named in honor of Mr. E. Hyatt, from whose collection it was obtained.

Gomphoceras amphora.

PLATE VII, fig. 9.

Gomphoceras amphora Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 207.

Shell of large size, elongate-ovate or short sub-fusiform, somewhat rapidly expanding from below upward to within a short distance of the base of the outer chamber; from which point it again contracts more rapidly to about one-half the height of the outer chamber, and is then drawn out into a narrow neck, resembling the neck of a bottle, of a width but little exceeding one-third of the diameter of the larger portion of the shell. Aperture not distinctly traced, but on the side figured, there is an appearance of a deep, rather narrow sinus, extending nearly one-half the depth of the outer chamber. The shell bears the appearance, also, of having been curved, as indicated principally by the obliquity of the septa, which are numerous, rather deeply concave, and arranged at a distance of about one-fourth of an inch in the largest part of the specimen, and decreasing in distance below and above; while near the base of the outer chamber there are about six septa closely crowded together. Position of the siphuncle not determined.

The species resembles *G. eximium* Hall, of the same formation, in the lower part of its length, although more rapidly expanding, but in the upper part, and especially near the aperture, differs entirely from any other species known.

Formation and Locality.—In the limestone of the Upper Helderberg group, in Marion Co., Ohio. Collection of Columbia College, New York.

Gomphoceras Sciotense.

PLATE VIII, fig. 4; PLATE IX, fig. 2; PLATE X, figs. 6 and 7.

Gomphoceras Sciotense Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 208.

Shell of medium size or smaller, short obconical in form, or rapidly expanding from the apex upward; slightly flattened in a dorso-ventral direction, giving a broadly oval transverse section, which is a little more flattened on the dorsal than on the opposite side, in the more perfect specimen, but may not be constantly so in all individuals. Septa shallow, arranged at nearly equal distances from each other in the larger parts, and numbering about seven in an inch, except near the outer chamber, where there are usually one or two more closely arranged. The outer chamber is proportionally short, and rapidly contracted in the upper part to about one-half the diameter below, to form the transversely sub-triangular or obscurely trilobed aperture, which is rounded at the lateral extremities, straightened on the dorsal side, and provided with a moderately deep but rather narrow sinus on the ventral margin. Siphuncle proportionally small, and situated close to the dorsal side.

Only two individuals have thus far been observed, and these show some slight variation in the form of the transverse section and in the proportional length of the outer chamber; the one retaining the chambers being shorter above, and more flattened on the dorsal side than the other. In this specimen, the septa are somewhat obliquely arranged, being highest on the dorsal side, which may, however, be owing to oblique compression in the matrix. The individuals, being both internal casts, have afforded no opportunity of observing the surface structure.

Formation and Locality.—In the limestone of the Upper Holdenberg group, at Smith and Price's quarries, near Columbus, Ohio. Collected by Mr. Hyatt.

Genus **CYRTOCERAS** Goldf.**Cyrtoceras cretaceum.**

PLATE VIII, figs. 2 and 3.

Cyrtoceras cretaceum Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 209.

Shell of medium size, somewhat moderately expanding in its upward growth to the base of the outer chamber, from which point it again contracts to the aperture; the increase not always regular, but in some individuals more abruptly expanding above than below. Shell slightly curving throughout its length, appearing less arcuate in the upper portion, owing to the contraction of the outer chamber toward the aperture. Transverse section oval, widest in a lateral direction, and with the inner surface much less arcuate than the outer or dorsal surface. Outer chamber proportionally short, the length not

exceeding the dorso-ventral diameter of the lower end; margin simple, so far as can be determined from any of the specimens, showing only a broad, shallow sinuosity on each side. Septa somewhat closely arranged and deeply concave, but slightly increasing in distance in the upper part, the average length of the chambers being about one-tenth of an inch, but somewhat more crowded just below the outer one. Siphuncle of moderate size, situated a little within the dorsal surface, and very slightly expanded within the chambers. Surface of the shell marked only by transverse lines of growth parallel to the margin of the aperture.

The shells are moderately abundant, and show slight variations in form among individuals, especially in the rate of increase in dimensions or in the regularity of the expansion, as well as in the comparative distance between the septa; a single individual showing a much greater distance between them in the upper part of its length. The shell would probably be considered by some as belonging to the genus *Oncoceras*, as the decrease in diameter in the upper part of the outer chamber gives to the shell, below, the peculiar bulging appearance supposed to be characteristic of that genus; but the transverse form and elliptical section, together with the form of the siphuncle and other features, present characters common to the genus *Cyrtoceras*. It is most nearly related, in general form, to *C. Conradi* Hall, from the Marcellus shales of New York but attains a much greater size, has a shorter outer chamber, and is destitute of the small lip-like sinus on the ventral side, as seen in that one. The upper portion of *Gomphoceras oviforme* Hall, from the limestone of the Marcellus shale, bears considerable resemblance, except in the closing of the aperture, which constitutes a generic difference.

Formation and Locality.—In the cherty layers of the Upper Helderberg limestone, near Dublin, and at Bellenaris quarry at Georgesville, Franklin Co., Ohio.

Genus **GYROCERAS** DeKoninck.

Gyroceras Columbiense.

PLATE X, fig. 8.

- *Gyroceras Columbiense* Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 210.

Shell of about a medium size, often attaining a diameter across the disk of about six inches, although the majority of the specimens seen will not measure more than five. The shell is closely coiled, the volutions being in absolute contact and about one and a half or two in number. Volutions nearly circular

in a transverse section, being a very little greater in the lateral direction than in the dorso-ventral, and the back of the volution barely perceptibly flattened on the outer portion of the larger one, but not perceptibly so on the inner portions. Septa deeply concave and distantly arranged; the chambers measuring about half an inch each, on the outer two-thirds of the body volution of a specimen where the vertical, or largest, diameter of the disk is five inches. Position of the siphuncle not absolutely determined. Surface of the shell unknown.

All the individuals of this species observed are internal casts, and occur in a rather rotten limestone, under conditions very unfavorable for the preservation of the shelly substance; consequently the surface characters have not been observed. It is an abundant species, but owing to the conditions of preservation, is not often found in collections. It will be readily distinguished from the other described species by the closely coiled volutions and the nearly circular section. It is perhaps more nearly related to *G. cyclops* Hall, 15th Rept. N. Y. State Cab. Nat. Hist., than to any other described species; but it differs from that one in its smaller size, and more rapidly increasing as well as more closely coiled volutions, and does not appear to have been provided with the broadly expanding and foliated varices which are so characteristic of that species. It might be objected, that as the shell of this species is unknown, the determination of the absence of these foliated expansions is not well authenticated; but it may be answered, that as the two species are associated in the same layers in the quarries where they are both rather common, if they were really one and the same, the shell would be preserved on these as well as on the *G. cyclops*, and the expansions readily detected.

Formation and Locality.—In the limestone of the Upper Helderberg group, near the lower part, at Smith and Price's and at other quarries near Columbus, Ohio.

Gyroceras seminodosum.

PLATE VIII, fig. 5.

Gyroceras seminodosum Whitf., Ann. N. Y. Acad. Sci., March, 1882, p. 211.

Shell small, compactly coiled, and consisting, in the specimen used, of a little more than two volutions, which increase rather rapidly in diameter with increased age; they are somewhat wider transversely than in a dorso-ventral direction, and are slightly triangularly elliptical in a transverse section; the greatest transverse diameter being very slightly outside of the middle of the dorso-ventral diameter. The inner one and a half coils are smooth on the

exterior, but the outer volution, for a little more than the larger half, is ornamented by a single series of comparatively large, transverse, triangularly elliptical nodes on each lateral surface, having the angular side of the node placed anteriorly and the opposite side nearly straight. The nodes are placed at distances from each other about equal to one-half the dorso-ventral diameter of the tube at the node indicated. The septa are not clearly defined and cannot be given with certainty; but they appear to be distantly placed on the inner portions of the shell, while on the nodose portion they seem to be placed at about half the distance of the nodes apart. The siphuncle has not been observed. The surface of the shell, as seen on a fragment of the substance remaining on the dorsum of the outer volution, is marked with rather close, distinct, revolving lines or ridges, crossed by more closely arranged transverse lines, which make a shallow retral bend in crossing the back of the shell.

The specimen is probably an immature shell, but is a distinctly marked species, differing strongly in its form and nodose character from any of those associated with it. It most nearly resembles *G. (Hercoceras?) paucinodus* Hall, from the Upper Helderberg group of New York (see *Illust. Dev. Foss.*, pl. 55, figs. 1 and 2), but is less distinctly triangular in a transverse section, that one being widest near the outer portion of the volution, with a nearly regular sloping surface on the side of the whorl to its junction with the preceding one, while this species is rounded. The form of the nodes is also different—those being situated near the dorsal margin. The triangular form of these nodes is peculiar in having the two short sides of the triangle directed forward. It also differs in having a greater number of volutions for a given diameter.

Formation and Locality.—In limestone of the Upper Helderberg group, near Dublin, Ohio. Collected by Mr. Hyatt, of the State University, at Columbus, Ohio.

NOTE ON THE MARCELLUS SHALE AND OTHER MEMBERS OF THE HAMILTON GROUP IN OHIO, AS DETERMINED FROM PALÆONTOLOGICAL EVIDENCE.

During the early summer of 1878, President Edward Orton wrote, asking if I could spend a few days with him in central and southern Ohio, in an effort to ascertain from palæontological evidence, the true horizon of certain layers of rock which had been somewhat of a difficulty to him; and in the month of August I spent several days with him for that purpose. While making these somewhat hurried observations at a locality about six miles N. W. of Columbus, in Perry Township, on the east bank of the Scioto River, we accidentally discovered a thin bed of dark brown shale, somewhat fissile and bituminous in character, in what Prof. Orton had considered as a representative of the Delaware limestone of Delaware, Ohio. The peculiar texture of the shales, occurring where I had expected only a light-colored limestone, excited my interest; and after a few minutes' examination, I discovered that they contain numerous flattened shells of *Leiorhynchus limularis*, Vanuxem. I also obtained from them two specimens of *Discina minuta*, and examples of *Lingula Manni* Hall; the two former being well-known and characteristic forms of the Marcellus shales of New York. On examination, we found that these shells, especially the *Leiorhynchus*, extended through a thickness of several feet of the rock, and that the peculiar bituminous character of the shale accompanied them, but with intercalations of thin layers of less bituminous and lighter-colored limestones. Subsequently, at a point nearly opposite Dublin, Ohio, some miles north of the above-mentioned locality, the same shale was again recognized in a corresponding horizon, accompanied by the same species, the *Leiorhynchus* being quite numerous. At a subsequent visit, Mr. Edward Hyatt obtained *Discina Lodensis* Hall, another New York Marcellus species. At this second locality, immediately above the shale, and while the limestone layers retain much of the bituminous character, the layers

become thicker and more calcareous, and their surfaces are covered with the shells of *Spirifera gregaria* Clapp, and *Tentaculites scalariformis* Hall, both of which are likewise common in the blue limestone layers at Delaware, Ohio.

A section of the rocks at the first-mentioned locality, six miles N. W. of Columbus, on the east bank of the Scioto, subsequently furnished by Prof. Orton, is as follows:—

The lower bed, No. 1 of section, is a heavy-bedded limestone about thirty feet thick, representing the Columbus quarries, including the coral beds and those containing the large cephalopods. (Lower Corniferous of the Ohio Geol. Rept.)

No. 2, a thin layer of limestone, four to six inches thick densely filled with teeth, plates and bones of fishes, locally known as the "Bone-bed."

No. 3, about thirty feet of thin-bedded shaly limestone, the "Delaware bed" of Prof. Orton. The upper part of this is supposed to represent the beds of similar character at Delaware, Ohio, which contain the large fish-remains.

No. 4, about fifteen feet of bluish, somewhat marly shales, the "Olentangy shales" of N. H. Winchell. This is followed above by the Huron shales, the supposed equivalents of the Genesee slates and Portage shales of New York.

Near the lower part of No. 3, only a few feet above the "Bone-bed," occurs the dark brown shale in question, with the peculiar fossils, which I have no hesitation in pronouncing the equivalent of the Marcellus shales of New York. Admitting this—and there certainly appears to be no alternative—the rocks found above this limit should represent the Hamilton group of the New York system; and we ought to find some fossils here, characteristic of that formation, which would not pass below this line. To ascertain if this was so, I requested Mr. Edward Hyatt, who has collected carefully the fossils around Columbus, to furnish me a list¹ of the species known, with their horizons indicated; and also requested the use of specimens of species not known to occur below the horizon of the "Bone-bed," that being the most easily recognized limit, and the one most generally studied in connection with the vertical distribution. Contrary to my expectations, the species yet known not

¹ These lists will be found appended at the end of the present article.

to pass below the "Bone-bed" are very few. These, with the exception of the *Tentaculites scalariformis*, have been illustrated on Plate VII, and are, with two exceptions, known Marcellus and Hamilton types, one being a new species, and the other (*Spirifera Maia* Bill.), occurring in the Upper Helderberg limestone in Canada. The examination of the upper layers for characteristic fossils was not carried far enough to make it perfect, owing to Mr. Hyatt's absence from Columbus; but the few forms found above these bituminous layers will readily be recognized as characteristic of the Hamilton group, and warrant one in considering the Black shales and other beds coming above these thin limestones in central Ohio, as equivalent to the Genesee slates and succeeding formations of New York.¹

The following lists, prepared by E. and H. Hyatt, of Columbus, Ohio, are from the limestones within 24 miles of that place. Those of the first list are from below the horizon of the "Bone-bed," and the next from above; *Strophomena rhomboidalis* being the only species fully recognized from both horizons. All species have been collected by them from known horizons, or have been seen from the beds by myself.

¹ Since writing the above remarks, Vol. V of the Palæont. of New York has been published. In it the author has, on p. 139, some remarks on the limestones at the Falls of the Ohio, and their relations to the Hamilton group of New York. After showing that the Hydraulic-cement beds of the Falls of the Ohio are the equivalents of the Hamilton group of New York (which had already been stated in the Geol. Rept. Ind., 1875, pp. 147, 148, and also shown in sections on page 157), the author remarks, "In the State of Ohio, similar conditions may be inferred, from the fact that certain known species of Hamilton fossils are published in the Ohio Geological Reports as from the Corniferous group." At the meeting of the Am. Assoc. for the Advancement of Science, at Saratoga, August, 1879 (see Proc. A. A. A. Sci., vol. xxviii, p. 297), I read a notice of the occurrence in Ohio of rocks representing the Marcellus shales of New York, embracing most of the substance of this note, and in which it was shown that a considerable thickness of the limestones previously recognized as "Corniferous" in Ohio, were above the horizon of the beds which I had recognized, from palæontological and lithological evidence, as of the age of the Marcellus shale, and would be of necessity equivalents of the Hamilton group. This was in August, 1879. The volume above-mentioned is dated, in the letter of transmissal, Dec. 15, 1879.

SPECIES FROM BELOW THE "BONE-BED."

PROTOZOA.

STROMATOPORA DeBlainville.

S. granulosa Nich.*S. nodulata* Nich.*S. ponderosa* Nich.*S. Sanduskyensis* Rominger.*S. substriatella* Nich.

CANNOPORA Phillips.

C. columnaris Nich.¹*C. densa* Nich.¹

RECEPTACULITES DeFrance.

R. Devonicus Whitf.

RADIATA.

FAVOSITES Lamarck.

F. basaltica Goldf.*F. Gothlandica* Lamarck. (?)*F. hemispherica* Yand. and Shumard.*F. invaginata* Nich.*F. pleurodictyoides* Nich.*F. polymorpha* Goldf. ?*F. turbinata* Billings.

MICHELINA DeKoninck.

M. convexa Emmons*M. maxima* Troost.

EMMONSIA Ed. and Haime.

E. Emmonsii Hall.

TRACHYPORA Ed. and Haime.

T. elegantula Billings.

AULOPORA Goldfuss.

A. cornuta Bill.*A. filiformis* Bill.*A. tubæformis* Gold. ?

SYRINGOPORA Goldf. ?

S. Hesingeri Bill.*S. Maclurei* Bill.*S. tabulata* Ed. and Haime.¹ Names given by Mr. Hyatt, which I cannot verify.—R. P. W.

ERIDOPHYLLUM Ed. and Haime.

E. Simcoense Bill.

• *E. strictum* E. and H.

E. Verneuillanum E. and H.

STYLASTREA Lonsdale.

S. Annæ Whitf.

ZAPHRENTIS Rafinesque.

Z. cornicula Ed. and H.

Z. Edwardsi Nich.

Z. gigantea Ed. and H.

Z. prolifica Bill.

Z. Wortheni Nich.

CYATHOPHYLLUM Goldf.

C. rugosum Hall.

C. Zenkeri Bill.

HADRIOPHYLLUM Ed. and H.

H. D'Orbigny Ed. and H.

HELIOPHYLLUM Ed. and H.

H. confluens Hall.

H. Halli Ed. and H.

AULACOPHYLLUM Ed. and H.

A. sulcatum Ed. and H.

CYSTIPHYLLUM Lonsdale.

C. Americanum Ed. and H.

C. Ohioense Nich.

CRINOIDEA.

MEGISTOCRINUS O. and S.

M. spinulosus Lyon.

DOLATOCRINUS Lyon.

D. multiradiatus Hall.

D. radiatus Hall.

BLASTOIDEA.

NUCLEOCRINUS Conrad.

N. Verneuilli Troost.

CODASTER McCoy.

C. pyramidatus Shumard.

ANCYROCRINUS Hall.

A. spinosus Hall.

MOLLUSCA.

BRYOZOA Emmerich.

STICTOPORA Hall.

S. Gilberti Meek.

LICHENALIA Hall.

L. lichenoides Meek.

BRACHIOPODA.

DISCINA Lamarck.

D. grandis Vanux. ?

CRANIA Retzius.

C. crenistriata Hall.*C. Hamiltoniæ* Hall.

ORTHIS Dalman.

O. Livia Bill.*O. propinqua* Hall.*O. Vanuxemi* Hall.

STREPTORHYNCHUS King.

S. flabellum Whitf.*S. pandora* Bill.

STROPHODONTA Hall.

S. ampla Hall.*S. demissa* Conrad.*S. hemispherica* Hall.*S. inequiradiata* Hall.*S. nacreæ* Hall.*S. Patersoni* Hall.*S. perplana* Conrad.*S. subdemissa* Hall. ?

STROPHOMENA Rafinesque.

S. rhomboidalis Wilck.

CHONETES Fischer.

C. acutiradiata Hall.*C. arcuata* Hall.*C. deflecta* Hall.*C. mucronata* Hall. ?*C. Yandellana* Hall.

PRODUCTELLA Hall.

P. spinulicosta Hall.

SPIRIFERA Sowerby.

S. acuminata Con.

- S. duodenaria* Hall.
- S. euruteines* Owen.
- S. fimbriata* Con.
- S. gregaria* Clapp.
- S. Greeri* Hall.
- S. macra* Hall.
- S. macrothyris* Hall.
- S. Manni* Hall.
- S. Marcyi* Hall.
- S. Oweni* Hall.
- S. segmenta* Hall.
- S. varicosa* Hall.

SPIRIFERINA D'Orb.

- S. raricosta* Conrad's sp.

CYRTINA Davidson.

- C. Hamiltoniæ* Hall.

MERISTELLA Hall.

- M. nasuta* Conrad's sp.
- M. scitula* Hall.

NUCLEOSPIRA Hall.

- N. concinna* Hall.

ATRYPA Dalman.

- A. reticularis* Linn.

RHYNCHONELLA Fischer.

- R. Billingsi* Hall.
- R. Carolina* Hall.
- R. Dotis* Hall.
- R. Thetis* Billings.
- R. ? raricosta* Whitf.

PENTAMERELLA Hall.

- P. arata* Hall.

TEREBRATULA Schlotheim.

- T. Sullivanti* Hall.

TROPIDOLEPTUS Hall.

- T. carinatus* Conrad.

LAMELLIBRANCHIATA.

AVICULOPECTEN McCoy.

- A. crassicosatus* H. and W.
- A. paralis* Conrad.

PTERINEA Goldf.

- P. flabella* Conrad? The specimens referred to this species are very doubtfully identified. They are large coarse forms, very unlike any of those in the higher beds.

MYTILARCA H. and W.

M. ponderosa H. and W.

M. percarinata Whitf.

CONOCARDIUM Brown.

C. trigonale Hall. *C. Ohioense* Meek, is the young of the above.

GONIOPHORA Phillips.

G. perangulata H. and W.

PARACYCLAS Hall.

P. lirata Conrad.

P. Ohioensis Meek=*P. lirata* Conrad. *P. occidentalis* H. and W.

MODIOMORPHA H. and W.

M. elliptica?

M. perovata Meek.

SANGUINOLITES McCoy.

S. Sanduskyensis Meek.

GASTEROPODA.

PLATYCERAS Conrad.

P. attenuatum Meek.

P. bucculentum Hall.

P. carinatum Hall.

P. conicum Hall.

P. dumosum Conrad.

P. multispinosum Meek.

P. squalodens Whitf.

PLATYOSTOMA Conrad.

P. lichen Hall.

EUOMPHALUS Sowerby.

E. Decewi Billings=*Pleuronotus Decewi* Hall.

TURBO Klein?

T. Kearneyi Hall=*Palæotrochus Kearneyi*.

T. Shumardi D'Vern.

ISONEMA M. and W.

I. bellatula Hall=*Callonema bellatula* Hall.*I. depressum* M. and W.*I. humile* Meek.

XENOPHORA Fischer.

X. antiqua Meek.

NATICOPSIS McCoy.

N. æquistriata Meek.*N. cretacea* H. and W.*N. levis* Meek.

LOXONEMA Phillips.

L. Leda Hall.*L. Hamiltoniæ* Hall.*L. parvulum* Whitf.*L. pexatum* Hall.

ORTHONEMA M. and W.

O. Newberryi Meek.

MACROCHEILUS Phillips.

M. priscus Whitf.

PLEUROTOMARIA DeFrance.

P. adjutor Hall.*P. Doris* Hall=*Cyclonema Doris* Hall.*P. Hebe* Hall.*P. Lucina* Hall.

MURCHISONIA DeVerneuil.

M. desiderata Hall.*M. Maia* Hall.*M. obsoleta* Meek.

DENTALIUM Linnæus,

D. Martini Whitf.

BELLEROPHON Montfort.

B. Newberryi Meek.*B. Pelops* Hall.*B. propinquus* Meek.

PTEROPODA.

CONULARIA Miller.

C. elegantula Meek.

TENTACULITES Schloth.

T. scalariformis Hall.

CEPHALOPODA.

ORTHO CERAS Breynius.

O. nuntium Hall.*O. Ohioense* Hall.*O. profundum* Hall.

TREMATOCERAS Whitf.

T. Ohioense Whitf.

GOMPHOCERAS Sowerby.

G. amphora Whitf.*G. eximium* Hall.*G. Hyatti* Whitf.*G. sciotense* Whitf.

CYRTO CERAS Goldfuss.

C. cretaceum Whitf.*C. Ohioense* Meek.*C. undulatum* Vanuxem?

GYROCERAS Meyer.

G. Columbiense Whitf.*G. Cyclops* Hall.*G. inelegans* Meek.*G. Ohioense* Meek.*G. seminodosum* Whitf.

CRUSTACEA.

DALMANIA Emmerich.

D. Calypso Hall.*D. Helena* Hall. = *D. Ohioense* Meek.*D. selenurus* Green.

PHACOPS Emmerich.

P. rana Green.

PROETUS Steiningcr.

P. crassimarginatus Hall.

SPECIES FROM ABOVE THE BONE-BED.

CRINOIDEA.

GONIASTEROIDOCRINUS Lyon.

G. spinigerus Hall.

BRACHIOPODA.

LINGULA Brugiere.

L. Manni Hall.*L. ligea* Hall.

DISCINA Lamarek.

D. Lodensis Hall.*D. minuta* Hall.

STROPHOMENA Rafinesque.

S. rhomboidalis Wilck.

CHONETES Fischer.

C. scitula Hall.*C. reversa* Whitf.

SPIRIFERA Sowerby.

S. Maia Billings.*S. zic-zac* Hall.

LEIORHYNCHUS Hall.

L. limitaris Vanuxem.

LAMELLIBRANCHIATA.

AVICULOPECTEN McCoy.

A. equilaterus Hall.

PTERINEA Goldfuss.

P. similis Whitf.

ACTINODESMA Sandberger.

A. subrectum Whitf.

GRAMMYSIA DeVern.

G. bisulcata Conrad.

NYASSA H. and W.

N. arguta H. and W.

RECOGNIZED SPECIES FROM THE MARCELLUS SHALES OF OHIO.

MOLLUSCOIDEA.

BRACHIOPODA.

Genus **LINGULA** Brug.**Lingula Manni.**

PLATE XI, figs. 1 and 2.

Lingula Manni Hall.; 16th Rept. State Cab. N. Y., p. 24; Pal. N. Y., vol. 4, No. 6, pl. 2, fig. 3.

Shell of medium size, longitudinally subovate, somewhat more than half as wide as long, very obtusely pointed at the upper end, with subparallel lateral margins, and often rather squarely truncate in front, with rounded basal angles. Substance of the shell thin and polished, with irregular concentric lines of growth which do not produce any marked surface character. Interior of the valves sometimes characterized by a thin, hair-like, median ridge, which extends to below the middle of the valve, leaving a distinct median depression on the east where the substance of the shell has been removed.

The specimens of this species are usually about three-fourths of an inch in length by a little less than half an inch in width. They vary considerable in outline, the variation being principally in the form of the front, some of them being much more round on the front margin than others, or than the type specimens. This variation also causes a difference in the form of the lateral margins producing a more rounded or oval form, and giving the shells an appearance approaching that of *L. Delia* Hall, Pal. N. Y., vol. iv, p. 12, pl. 2, fig. 9. The two forms are associated in the shales and can scarcely be considered as distinct species. Many of the specimens are so distinctly like *L. Manni*, that it seems impossible the others having so slight a difference in form could be distinct, that I have not thought it advisable to attempt their separation.

Lingula ligea ?

PLATE XI, figs. 3 and 4.

? *Lingula ligea* Hall; Pal. N. Y., vol. 4, part 1, p. 7, pl. 1, fig. 2.

Shell elongate elliptical in general outline, being about twice as long as wide, rounded on the anterior end, and slightly more pointed at the beak in full grown forms; but in young or partly grown shells the extremities appear nearly equal. Valves moderately convex, and sometimes a very little flattened along the middle. Surface marked by fine concentric lines of growth.

The examples referred with some slight doubt to this species are quite numerous in the thin bedded layers of bituminous limestones from above the "Bone-bed," at Smith and Price's quarries, near Columbus, Ohio. The young shells have much the appearance of *L. spatulata* Hall, but when fully grown are almost exactly of the character of *L. ligera*.

Genus **DISCINA** Lamarck.**Discina minuta.**

PLATE XI, figs. 5 and 6.

Orbicula minuta Hall, Geol. Rept. 4th Dist. N. Y., p. 180.*Discina minuta* Hall, Pal. N. Y., vol. 4, p. 16, pl. 1, fig. 16.

Shell minute, subcircular. Dorsal valve moderately convex or flattened as occurring in the shales, the apex situated a little nearest the posterior margin, often about one-third of the diameter from the border, pointed and directed toward the posterior or peduncular margin. Ventral valve not observed. Surface of the shell marked only by closely arranged, very fine concentric striae.

The shells of this species usually occur of about three-sixteenths of an inch in diameter, and are usually very much flattened by compression in the shales. They closely resemble those from the black Marcellus shales of New York, but lack that convexity and finely polished surface usually present on the Avon specimens.

Formation and Locality—In the brown shales capping the Upper Helderberg limestone near Dublin, Ohio.

Discina Lodensis.

PLATE XI, fig. 7.

Orbicula Lodensis Hall, Geol. Rept. 4th Dist. N. Y., p. 223.*Orbicula Lodensis* Vanuxem, Geol. Rept. 3d Dist. N. Y., p. 168.*Discina Lodensis* Hall, Pal. N. Y., vol. 4, p. 22, pl. 1, fig. 14.*Discina media* Hall, Pal. N. Y., vol. 4, p. 20, pl. 2, figs. 25-29.

A single lower valve, referable to this species, was obtained from the black shales. The form is subcircular and discoid, a little nar-

rowed toward the peduncular margin, and broadest forward of the middle. Foramen comparatively small, narrowly elliptical, not extending quite to the margin, the inner end not reaching to the centre of the disk; the point of origin on the valve being slightly excentric. Surface marked by fine, not closely arranged, elevated, concentric lines.

The specimen described and figured very closely resembles the New York species above cited; so nearly so in fact as to preclude the possibility of detecting specific differences. The specimens from New York differ greatly among themselves in the general form and outline of the valves; so that on this character alone it would not be safe to rely; and the general features of the shell, so far as can be determined from a single valve, are the same in both cases.

Formation and Locality.—In the brown shales at the top of the Upper Helderberg limestone near Dublin, Ohio.

Genus **CHONETES** Fischer.

Chonetes scitula.

PLATE XI, fig. 10.

Chonetes scitula Hall, Pal. N. Y., vol. 4, pt. 1, p. 130, pl. 21, fig. 4.

Shell small and semicircular in outline, or in some cases semi-ovate being a little more than half of a circle. Hinge-line as long or a little longer than the shell below, and but slightly mucronate at the extremities. Ventral valve nearly equally convex or a little depressed just within the cardinal extremities. Dorsal valve flattened or slightly concave. Surface marked with about sixty, fine, even striæ in the larger specimens, as counted on the ventral valve, and the hinge-line bears three short spines on each side of the beak.

The specimens being in limestone are all much exfoliated, so that the surface striæ are not distinctly shown toward the cardinal borders. The shells are perhaps a little longer than the more typical forms of *C. scitula* as they occur in the Hamilton shales near Cayuga Lake, N. Y., and are somewhat intermediate in this respect between those and *C. Yandelli* Hall, from the hydraulic limestones from near Louisville, Ky.

Formation and Locality.—In thin-bedded bituminous limestones of the Marcellus shale, above the "Bone-bed" at Smith and Price's quarries, near Columbus, Ohio.

Chonetes reversa.

PLATE XI, figs. 8 and 9.

Chonetes reversa Whitf., Ann. N. Y. Acad. Sci., 1882, 213.

Shell of about a medium size, semicircular in outline, with a long straight hinge-line exceeding the width of the shell below. Valves resupinate, or reversed in their curvature; the ventral being very slightly convex in the earlier stages of growth, and subsequently recurved so as to appear concave; the entire deflection from a plane being very little, so that the general appearance of this valve may be said to be nearly flat. Area linear. Hinge-line ornamented by four, long, very slender spines on each side of the centre, which are projected from the hinge-line at an angle of about 65 degrees, measured on the outside; or 115 degrees as counted on the inside of the spine. Surface of the ventral valve marked by exceedingly fine striæ, which are slightly alternating in size; there being from two to five finer ones between the coarser kind. Interior of the valve characterized by fine pustules, arranged in indistinct lines, presenting the usual characteristics of the genus. Dorsal valve not positively known; but there is associated with it, in the same layers, a slightly convex valve with similar striæ, but more distinctly alternating, which may possibly represent this valve. Its form is similar, and the convexity correspondingly great.

This species is peculiar in its resupinate character, so far as the genus is known in American Devonian rocks, and this character, together with its form, its fine striæ, and its nearly erect slender spines, will readily distinguish it from any other species. The dorsal valve above spoken of was at first supposed to be the young of *Strophodonta perplana* Conrad's sp., but the similarity in size and character of striæ to this species renders it doubtful.

Formation and Locality.—In thin-bedded bituminous limestone, from above the "Bone-bed" at Smith and Price's quarries, near Columbus, Ohio.

Genus **SPIRIFERA** Sowerby.**Spirifera Maia.**

PLATE XI, fig. 14.

Athyris Maia Billings, Can. Jour. Ind. Sci. and Arts, May, 1860, p. 276.*Spirifera Maia* (Bill.) Hall, Pal. N. Y., vol. 4, pt. 1, p. 416, pl. 63, figs. 6-13.

Several single valves of this species have been obtained from the thin-bedded limestones, associated with the Discina and Leiorhynchus bearing shales, on Mr. Meeter's farm, two and a half miles south of Dublin, Ohio; but in too imperfect a condition for illus-

tration; still, however, sufficiently distinct to leave no reasonable doubt of their identity. They are smaller in size than those from the Upper Helderberg limestone of Canada, but otherwise not different so far as can be discovered from the imperfect material on hand.

Genus **LEIORHYNCHUS** Hall.

Leiorhynchus limitaris.

PLATE XI, fig. 11.

Orthis limitaris Vanuxem, Geol. Rept. 3d Dist. N. Y., 1842, p. 146, fig. 3.

Atrypa limitaris Hall, Geol. Rept. 4th Dist. N. Y., 1843, p. 182, fig. 11.

Leiorhynchus limitaris Hall, 13th Rept. State Cab., p. 85, 1860.

Leiorhynchus limitaris Hall, Pal. N. Y., vol. 4, p. 356, pl. 56, figs. 6-21.

Shell small in size, seldom exceeding five-eighths of an inch in width and usually not more than three-eighths; form orbicular in outline and lenticular in profile when not compressed. Valves subequal in depth and rotundity, the ventral beak slightly extending beyond that of the dorsal and the middle third or more of the width of the valve depressed, forming a broad but shallow sinus which extends to within a short distance of the beak. Dorsal valve elevated in the middle to form the fold which corresponds to the sinus of the ventral, but which does not continue much beyond the middle of the valve. Surface of the shell marked by from ten to twelve or more low, angular plications, four or five of which are seen in the sinus of the ventral, and a corresponding number elevated on the fold of the dorsal valve, and from three to four or even five mark each side of the shell beyond the limit of the fold and sinus. The specimens are usually marked also by several strong concentric lines of growth which form strong varices on the larger specimens, and the plications are not unfrequently divided by slighter depressions along their surfaces, which gives them the appearance of being bifurcated, and the plications themselves are very unequal in strength and seldom extend entirely to the apex of the valves.

This shell is a very well-marked species and cannot well be mistaken for any other of the several species, which, so far as is yet known, are limited to certain horizons; this one characterizing the horizon of the Marcellus shale in New York, wherever the species has been found. Its occurrence in Ohio has not heretofore been known or suspected, and its presence in numbers, flattened and compressed in a dark brown, somewhat fossil shale, presenting so exactly the characters and appearance that it does in the shales of New York, and also associated with other characteristic forms of the Marcellus shale, is a somewhat significant fact, and one of considerable importance in its stratigraphical relations.

MOLLUSCA.

LAMELLIBRANCHIATA.

Genus **AVICULOPECTEN** McCoy.**Aviculopecten? equilatera.**

PLATE XI, fig. 16.

Avicula equilatera Hall, Rept. 4th Dist. Geol. Surv. N. Y., 1843, p. 180, Table 71, fig. 7.¹

Shell small and slightly oblique, somewhat trapezoidal in outline, hinge-line straight and as long as the greatest length of the shell; beaks nearly central on the hinge; anterior cardinal angle mucronate, and the anterior border gradually sloping backward from the point; basal border broadly rounded; posterior margin slightly extended at the lower third beyond the extremity of the hinge, and also slightly sinuate above to form the sulcus of the posterior wing, which is small and rounded. Surface of the valves very depressed convex, and marked by numerous fine bifurcating radii, and also by several concentric undulations which give to the shell a strongly corrugated appearance.

The species is, in New York, a very characteristic form of the Marcellus shales, and is readily distinguished from any of those of the Hamilton or other formations by its fine striæ and corrugated surface. The striæ, although somewhat increasing in strength toward the margin, are frequently bifurcated so that the increase in strength is not equal to that of simple radii.

Formation and Locality.—In the bituminous shale from above the "Bone-bed" at Smith and Price's quarries, near Columbus, Ohio, associated with *Discina minuta* and *Leiorhynchus limitaris*.

Pterinea similis.

PLATE XI, fig. 15.

Pterinea similis Whitt., Ann. N. Y. Acad. Sci., 1882, p. 214.

Shell small, oblique; the body, exclusive of the wings, being almost regularly although obliquely ovate in outline, the anterior part being the larger; hinge-line about two-thirds as long as the entire length of the valve; anterior wing small, distinctly rounded on the end, and separated from the body of the shell, on the left valve, by a distinct sulcus along the surface, and which

¹ This is probably the *A. (Pterinopecten) invalidus* Hall, of Pal. N. Y., vol. 5, part I, pl. 1, fig. 18.

constricts the margin of the shell; posterior wing one-third longer than the anterior side, pointed at the extremity and sinuate below. Body of the valve ventricose, strongly so on the umbone, with a strong, tumid beak, which projects distinctly beyond the hinge. Surface of the left valve marked by distinct radii, which plainly alternate in strength over the body of the valve, but less distinctly so toward, and on the wings; also, by less strong concentric lines, and varices of growth. Right valve unknown.

The shell is of the type of *Pterinea decussata* Hall, which occurs abundantly in the Hamilton group in New York, but is of extremely small size, and very ventricose; the proportionally strong varices of growth showing its adult character. The type is one represented in the Devonian rocks, from the Hamilton to the top of the Chemung, inclusive, in New York, by several distinct species, but which is seldom recognized below this horizon. We may, therefore, consider it as an additional evidence of the age of the beds in which it is found.

Formation and Locality.—In the thin shaly layers of bituminous limestone, from above the "Bone-bed" at Smith and Price's quarries, near Columbus, Ohio.

SPECIES FROM THE LIMESTONES ABOVE THE "BONE-BED," IN
THE VICINITY OF COLUMBUS, OHIO, AND NOT KNOWN
TO OCCUR BELOW THAT HORIZON.

ECHINODERMATA.

CRINOIDEA.

Genus **GILBERTSOCRINUS** Phillips.

Gilbertsocrinus spinigerus.

PLATE XI, fig. 12.

Trematocrinus spinigerus Hall, 15th Rept. State Cab., p. 128.

Gilbertsocrinus (*Trematocrinus*) *spinigerus* Hall, Descript. of New Species of
Crinoidea from the Carboniferous rocks of the Mississippi valley, plate
1, fig. 9.

Body small, of nearly equal height and width, broadly truncated at the base, slightly rounded and expanded in the lower half of the height, but generally contracted above to the base of the arms. The base of the cup is deeply impressed, including the basal and sub-radial plates; the first radials form the lowest part of the cup, the second radials are placed at the point of its greatest diameter, and the third at about one-half of the entire height. The first and second radials are comparatively large, the first being heptagonal, the second hexagonal and the third which are smaller than the second are heptagonal, obtusely cuneiform above, and support on each sloping face two proportionally large supra-radial plates, one above the other, the upper face of the second one of which is excavated and its surface cicatrized for the attachment of the true arms, while the summit arms arise from above and are formed by the junction of the plates from the two adjacent rays. The first interrarial plates are moderately large, are truncated below and rest on the upper truncated ends of the subradials, thereby separating the first radials of the adjacent rays from each other. Above the first interradians the plates are in arches of three plates each for two or three transverse ranges with two and then one at the top, except in a single lateral area where there is but two plates transversely.

The anal area is somewhat larger than the other areas, but the arrangement of plates cannot be determined from excess of silicification. The inter-supra-radial areas are marked by two plates in each, situated one above the other, the second one having its upper end forming a part of the summit or dome of

the crinoid. The summit arms have been small but proportionally strong at the base, the earlier series of plates only being preserved.

The surface of the plates has been elevated in the middle and perhaps ridged in a stellate manner, but they are too small and too much weathered to allow of a perfect determination of this feature. The centre of the radial series is elevated so as to form a distinctly marked ridge traversing the series from and above the third radial; while the first and second radials bear short obtusely rounded spines, of a length somewhat greater than the diameter of the plate. The spines of the first radials project outward and downward at an angle of nearly forty-five degrees to the line of the base, while those of the second radials are a little inclined below a horizontal.

I had at first described this as a distinct species from the New York form, on account of the less depressed interrarial areas, but on more critical comparison have decided that this may be only an individual difference. It agrees so nearly in all the details of structure in the permanent features of the crinoid, that it does not seem possible to point out any distinguishing features that can be called specific. It is true that in the details of the true and summit arms there may have been distinguishing characteristics, but in their absence I should prefer not to name it as a different species from that one.

Formation and Locality.—In limestone above the "Bone-bed," at Smith and Price's quarries, near Columbus, Ohio. Hyatt Brothers, collectors.

MOLLUSCOIDEA.

BRACHIPODA.

Genus **SPIRIFERA** Sowerby.

Spirifera ziczac.

PLATE XI, fig. 13.

Dethyris ziczac Hall, Geol. Rept. 4th Dist. N. Y., 1843, p. 200, fig. 5.

Spirifera ziczac Hall, Pal. N. Y., vol. 4, p. 222, pl. 35, figs. 15-23.

The specimens of this species recognized in Ohio are in a very imperfect condition, being single valves preserved in a limestone matrix, and consequently much exfoliated when detached from the rock. Enough, however, remains to show the strongly lamellose structure of the surface, which together with the form of the shell and the mesial rib in the bottom of the sinus of the ventral valve is sufficient to fully characterize them as belonging to this species.

The form of the ventral valve is somewhat triangular, much wider than high, the beak somewhat prominent and extended beyond the line of the hinge; body of the valve ventricose and strongly arcuate, with a deep, moderately wide mesial sinus, the bottom of which is occupied by a slightly elevated rib, corresponding to the depression in the fold of the dorsal side; from eight to ten angular ribs occupy each side of the valve; cardinal area moderately high and incurved, foramen nearly as wide as high. Surface of the shell marked by strong, concentric, lamellose lines.

Formation and Locality.—In the blue limestone layers above the "fish-beds" at Delaware, Ohio.

MOLLUSCA.

LAMELLIBRANCHIATA.

Genus **PTERINEA** Goldfuss.

***Pterinea flabella*.**

PLATE XI, fig. 17.

Aracula flabella Conrad, Jour. Acad. Nat. Sci. Phila., 1st series, vol. 8, p. 238, pl. 12, fig. 8.

Aracula flabella (Conrad), Vanux., Geol. Rept. 3d Dist. N. Y., 1842, p. 152, fig. 3.

Shell obliquely subrhombic including the wings, or the body of the valves alone obliquely ovate, largest below. Hinge line straight, generally pretty long, especially on the posterior side, the wing on this side usually extending backward as far as the posterior extremity of the body of the shell, and sometimes even beyond that point; but always distinctly separated from it by a broad, more or less deep, rounded sinus; leaving the wing of a triangular form, with the extremity sometimes rounded but often pointed or even mucronate. Anterior wing on the left valve very much smaller, but still well developed, rounded on the margin, sloping on the cardinal border, and separated from the body of the shell by a broad, often deep rounded channel, which gradually widens with the growth of the shell. Body of the left valve highly convex, and often with an abrupt cardinal slope much straightened beyond the middle of the length. Beak large, tumid, projecting somewhat beyond the cardinal border, and placed at about one-third or less than one-third of the entire length of the cardinal line from the anterior extremity; anterior border of the valve rounding backward from a little below the sinus of the anterior wing, and usually forming a nearly regular curve to beyond the middle of the valve before beginning the upward curvature of the posterior portion. Posterior extremity of the valve subangular at the point of greatest length. Surface of the left valve marked by several strong, distinct, radiating costæ, varying

in number on different individuals but usually ten or twelve; those making the centre of the valve and on the umbonal slope being nearly straight in their direction from the beak to the base of the shell; while those nearer the anterior end become more and more curved in their direction as they approach the margin. From three to five intermediate smaller costæ occupy the usually slightly concave but often flattened interspaces. The entire surface of the valve is often marked by more or less strongly marked concentric lines of growth, which in crossing the stronger radii often form lamellose projections on their surfaces when perfectly preserved, but are usually represented by small knotty prominences as commonly seen. The posterior wing is often marked by indistinct radiating lines, though not uncommonly these are entirely obsolete, and the concentric lines are strongly marked. The right valve of this shell is very slightly concave, proportionally smaller than the left with the radiating lines much subdued, and the concentric lines not so elevated or knotty.

- The specimens of this species observed from the rocks above the "Bone-bed," in Ohio, have been left valves mostly. I have a recollection, however, of having seen one slab in the Ohio State Collection, at Columbus, which contained the impression of one right and one left valve, possessing the usual features of the species common in the Hamilton rocks of New York; and which was said to be from layers above the "Bone-bed." The specimen figured on Plate XI, fig. 17, is from this horizon, and presents all the features common to the New York Hamilton forms, including the great gibbosity of the left valve. In the Upper Helderberg limestones of New York few representatives of this species have been recognized, and those present a coarser ruder form than the Hamilton group specimens; and specimens from the limestones from below the "Bone-bed," near Columbus are not uncommon, but are very large, very coarse, and rude in character, having but a distant resemblance to the typical forms of the species. These I strongly suspect are properly a distinct species, but the examples thus far obtained have been of so imperfect a character as not to furnish characters sufficiently marked to determine this question.

Formation and Locality.—In rocks above the "Bone-bed;" horizon known as the "Petroleum Rock," in Tully Township, Marion Co., Ohio. The specimen figured is from the State collection at Columbus, and was collected by the Rev. Mr. Herzer.

Genus **ACTINODESMA** Sandb.**Actinodesma subrecta.**

PLATE XI, fig. 20.

Actinodesma subrecta Whitf., Ann. N. Y. Acad. Sci., 1882, p. 215.

Shell of moderate size; the body of the shell, exclusive of the wings and hinge extensions, ovate in outline, and slightly oblique to the cardinal line. Hinge-line extended in the form of strong auriculations or wings on the sides of the shell, the upper margin straight, or a little declining on each side of the beak; anterior wing short, triangular and divided from the body of the shell by a deep and wide sub-triangular notch; posterior side long and sub-mucronate at the extremity, three to three and a half times as long as the anterior side, and its area much greater, extending along the body of the valve to nearly half its length from the beak. Body of the left valve more than moderately convex, and strongly arcuate or bent between the beak and base of the shell; so that when placed on a flat surface, the margin, especially on the posterior side, would be much elevated above the plane. Beak of the valve large, sub-tumid, and slightly extended above the cardinal line. Length of the body of the shell, from the cardinal line to the base, about one-fifth greater than across it in the opposite direction. Anterior border broadly rounded, the basal margin more sharply so, with a slight angularity at its junction with the nearly direct posterior border. Surface of the shell marked by irregular, concentric, strongly lamellose lines, resembling those of the oyster. Right valve not yet observed from Ohio.

The species is allied to *A. recta*—*Avicula recta* Conrad, but is shorter, more ventricose on the left side, more arcuate or bent, and with less extended wings. It is not an uncommon species in the soft shales of the Hamilton group of New York, where it is readily recognized from *A. recta* by the above-mentioned characters. The *A. recta* is most common in the arenaceous beds of eastern New York, while this is the prevailing form among the soft shales further west. The right valve is there recognized as being shorter than the left, concave instead of convex, with an appressed beak or umbo not extending beyond the cardinal line, and the valve is much thinner in its substance.

Formation and Locality.—In layers of brownish limestone above the "Bone-bed," at Fishinger's mill, Franklin Co., Ohio. Collected by the Hyatt brothers, of the State University at Columbus.

Genus **NYASSA** H. & W.

Preliminary Notice of Lamellibranchiata shells of the Upper Helderberg Hamilton and Chemung Groups, etc., Albany, N. Y. 1869, p. 28 (generic description omitted);—Whitf., Ann. N. Y. Acad. Sci., 1882, p. 216.

Shells bivalve, very oblique and transversely ovate in form. Posterior hinge-plate narrow, bearing from one to four long, slender, ridge-like teeth. Anterior plate broad, marked by numerous small point-like teeth with intermediate depressions, arranged somewhat radiating from the middle of its inner border. Adductor muscles two, one at each extremity. Pallial line entire. Ligament internal. Type, *N. arguta*. Name, mythological. Geological range, so far as known, Devonian. Family relations apparently near *Megalomus* Hall, and *Megalodon* Sowerby.

Nyassa arguta.

PLATE XI, fig. 18.

Nyassa arguta H. and W. Prelim. Notice of the Lamellib. Shells of the Upper Held., Hamilton and Chemung Groups, etc., Albany, N. Y., Dec. 1869, p. 28;—Whitf., Ann. N. Y. Acad. Sci., 1882, p. 216.

Shell of medium size, transversely sub-ovate or sub-trapezoidal, much longer than high. Valves moderately ventricose, most prominent along the umbonal ridge, which is rather strongly arcuate and sub-angular. Beaks rather small and appressed, slightly incurved, and situated near the anterior end. Surface of the valve generally declining from the umbonal ridge to the basal line, and with a slight sinus or sulcus below the ridge, which gradually widens toward the margin of the shell, where it causes a broad, but not marked, emargination in the border of the shell. Cardinal slope narrow and abrupt; hinge-line arcuate; posterior end of the shell narrowed; anterior end broad, rounded, and slightly excavated below the beaks.

Surface of the shell marked by concentric lines of growth parallel to the margin of the valve, and often forming rather strong, irregular varices, most distinctly marked on the anterior half of the shell.

The Ohio specimens, although preserved in an entirely different matrix, are yet such exact counterparts of the New York shells that no question can exist of their positive identity.

Formation and Locality.—In limestone above the "Bone-bed" in Tully Township, Marion Co., Ohio. The specimen figured is from the State Cabinet at the State University, Columbus, Ohio.

Genus **GRAMMYSIA** DeVern.

Grammysia bisulcata.

PLATE XI, fig. 19.

Pholadomya anomala Goldf. Pet. Germanica, p. 272, pl. 157, fig. 9.

Pterinea bisulcata Conrad, Ann. Rept. Geol. Surv. N. Y., 1838, p. 16.

Cypriocardites bisulcata Conrad, Ann. Rept. Geol. Surv. N. Y., 1841, p. 52.

Grammysia Hamiltonensis DeVern., Bul. Geol. Soc., France, 2d Series, vol. 4, p. 696, 1847.

Cardinia Hamiltonensis DeOrb., Prod. Palæon., vol. 1, p. 76, 1850.

Grammysia bisulcata Conrad, H. and W. Prelim. Notice Lamellib. Shells of the Up. Held. Hamilton and Chemung Groups. Published as ext. from Rept. State Cab., Dec. 1869. (Anonymously.)

Specimens of this species, presenting all the specific features of the typical forms from the Hamilton beds of New York, and found at Fishinger's Mills, Sciota, Ohio, in beds of limestone above the "Bone-bed."

The general form is transversely elliptical, a little more than half as long again as high, the valves usually compressed somewhat in the direction of bedding, but still moderately convex and extremely Unio-like in their general expression. The body of the valves is marked by the characteristic oblique rib and furrow passing from the beak to the postero-basal margin, somewhat modifying its border; also by numerous concentric folds or wrinkles parallel to the margin of the shell, and marking stages of growth. These wrinkles are usually well marked on the anterior end of the shells, and become faintly marked or obsolete posterior to the oblique furrow, and on the rather wide posterior cardinal slope. The hinge-line is nearly straight and shorter than the length of the shell behind the beaks, causing an oblique truncation of the posterior end above the longest point of the valve. Beaks large, tumid, situated well forward on the valves and enrolled. The oblique ridge is generally more or less nodose from the crossing of the concentric folds of the shell.

This species has always been considered a very characteristic and well-marked Hamilton type; and its occurrence in layers above the horizon of the "Bone-bed," and not below, is very significant.

FOSSILS OF THE ERIE SHALES.

There appears to be no question regarding the equivalence of the Erie shales of Ohio with the Portage and Chemung groups of New York; and the Palæontological features of these latter formations are so well known, and so marked, that there ought to be no doubt as to their geological position. Their stratigraphical relations also to the Catskill group, the American equivalents of the Old Red Sandstone of England, which is considered as typical Devonian, would apparently leave no doubt as to their place in the geological record, or to the zoological age to which they should be referred. From these considerations I have considered the following fossils from the Erie shales, as of Devonian age, an opinion for which I alone may be held responsible. The group, taken as a whole, are of special interest on account of the Crustaceans; while the other forms associated with them are sufficiently characteristic to show their stratigraphical relations.

MOLLUSCOIDA.

Genus **DISCINA** Lemarck.

Discina humilis.

PLATE XII, figs. 1 and 2.

Discina humilis Hall, Pal. N. Y., vol. 4, p. 16, pl. 2, fig. 18.

A crushed and fragmentary specimen of this species, but quite too imperfect for illustration, has been detected in one of the nodules from the Erie shale at Leroy, Lake Co., Ohio. The shell shows it to have been circular, nearly discoid in form, with the surface covered by distant elevated lines or ridges, and corresponds in all respects, as far as can be seen on the specimen, to those from the Marcellus shale and Hamilton beds of New York.

Genus **ORTHIS** Dalman.**Orthis tioga.**

PLATE XIII, fig. 3.

Orthis tioga Hall, Pal. N. Y., vol. 4, p. 59, pl. 8, figs. 20-29.

Among the concretionary nodules of the Erie shale from Leroy, Lake Co., there is one which contains impressions, or casts, of several valves of the above-named species. The specimens are somewhat smaller than the general run of the New York Chemung specimens, but otherwise cannot be distinguished from them. The most entire ones are dorsal valves, and are moderately convex, with a decided mesial sinus. The form is transversely oval or elliptical, with a short cardinal area and small depressed beak; the striæ are rather coarse, frequently bifurcated and much recurved on the cardinal margins and slopes, many of them running off on the cardinal border. Muscular scars large and sub-flabellate, all the features being the same as the typical forms of the species, modified only in size.

Genus **PALEONEILO** H. and W.

Preliminary Notice of Lamellib. Shells of the Upper Held., Hamilton and Chemung groups, etc., N. Y. State Cab. Nat. Hist., Dec. 1869, p. 6.

Palæoneilo similis.

PLATE XII, figs. 4 and 5.

Palæoneilo similis Whitf., Ann. N. Y. Acad. Sci., 1882, p. 217.

Shell oblong, with nearly equally rounded extremities, and almost parallel dorsal and ventral margins. Anterior end short, a little narrower than the body of the shell, resulting from the constriction below the beaks. Posterior end rounded, with a slight oblique truncation below the middle of the height, corresponding to the very shallow umbonal sulcus of the valves. Beaks situated within the anterior third of the length of the shell, small and enrolled. Valves ventricose, most prominent just below the umbones, and slightly sulcated along the posterior slope. The surface of the shell, so far as can be determined from the matrix, has been smooth or without visible markings. On the internal cast, the condition in which the specimens are found, the muscular imprints are faintly marked—the pedal muscles being the most distinct.

The species is closely related to *P. (Leda) Barrisi* White and Whitf., Proc. Bost. Soc. Nat. Hist., vol. 8, p. 298 (*Palæoneilo Barrisi* (W. and W.)), H. & W., Prelim. Notice of Lam. Shells

of the Up. Held., Hamilton and Chemung groups, etc.), but has been somewhat more nearly parallel on the margins, and has a smoother shell.

Formation and Locality.—In calcareous concretions of the Erie shale, at Leroy, Lake Co., Ohio, accompanying the fossil entomostreacan from the same locality (next described).

CRUSTACEA.

PHYLLOPODA.

In the 16th Rept. State Cab. New York there is represented a peculiar bivalve crustacean from the Hamilton group of that State, under the name of *Ceratiocaris punctata*; and in the Illustrations of Devonian Fossils, Plate 23, fig. 7, Section Crustacea, it is repeated under the name *Ceratiocaris (Aristozoe) punctata*. Among the fossils of the Erie shales of Leroy, Lake Co., Ohio, similar forms have been detected, but specifically distinct from the New York forms: Others, not yet described, have been observed from the Hamilton and Chemung groups of New York. The Ohio species here given, together with the Macrurian decapod and the following observations on the genera with but slight modifications, were published in the Am. Jour. Sci. and Arts for January, 1880, as preliminary to this report.

The fossils in question differ from the true types of *Ceratiocaris* in so many particulars, and to so great an extent, that it is quite impossible to include them under that genus. The reference to *Aristozoe* Barr. is, however, still more erroneous, as the forms to which that name is applied by its author are true Ostracoids, having all their parts concealed within the carapace, as in *Leperditia* and its allies; while the forms under consideration are provided with a bivalve, or at least a two-sided carapace, which incloses the thoracic portions; while the abdomen and caudal parts are naked, or not inclosed within this covering, and are more properly classed among the Phyllopods.

That this latter character, the naked abdomen and caudal plate, pertains to these organisms, is abundantly proven by the Ohio specimens now under consideration. The fossils are found inclosed in small concretions; and there would be but little chance for specimens, or parts of specimens of different species, or less likely

of parts of individuals of distantly related generic forms, to be inclosed in the same small concretion; so we may safely conclude, that, where parts or fragments of individuals of corresponding size are found in the same concretion, they are parts of one individual, or at most, of the same species. In the concretions in question, there are two examples where parts of the naked abdomen and caudal plate with its accompanying spines, are imbedded in the concretion together with the carapace which I have classed as of the same species. This I consider as ample proof that the parts belong to the one individual; and that the animal of which they are the remains, was provided with a naked body and spinose caudal appendage as in *Ceratiocaris*. It is also stated in the *Illust. Dev. Foss.*, that one specimen resembling *C. punctata*, has been found with a body similar to that called *C. armata*, attached to the carapace, showing their individual relations.

The several species above mentioned, while differing greatly from *Ceratiocaris*, possess features in common which at once characterize them as a natural group, sufficiently marked to be readily distinguished. I therefore propose to recognize them as a distinct genus under the generic name **ECHINOCARIS** possessing the following characters:—

Genus **ECHINOCARIS** Whitf.

Echinocaris Whitfield, Am. Jour. Sci. and Arts, 3d series, vol. 19, p. 34, 1880.

Carapace bivalve, valves subovate in outline; united on the dorsal margin by a straight hinge; the anterior, basal, and posterior margins rounded, and generally more or less produced posteriorly. Surface of the valves marked by a more or less distinctly elevated, curved, longitudinal ridge, centrally or subcentrally situated; also by one or more (usually three) vertical ridges, or ridge-like nodes, extending from the hinge-line on the body of the valve, and usually situated anterior to the middle of the length. Abdomen naked, composed of several segments (four known) and a caudal plate, which is produced into an elongated spine with a lateral, movable spine on each side. Posterior margin of the abdominal segments bearing spines on the now known species.

Type *Echinocaris sublevis* Whitf.

Among the genera now known and referred to of the *Ceratiocaridæ* there are several distinct types of structure, indicated by the features of the carapace alone, independent of the changes which take place in the abdominal segments and in the caudal spine and appendages. The following synopsis of some of their characters may serve to illustrate their peculiarities and to show more distinctly the relations which **ECHINOCARIS** bears to other known genera:—

1st Section: Carapace more or less elongated, with a straight or slightly arched dorsal line; anterior end sharply rounded or pointed (rostrate); posterior end truncate; sides convex, smooth, or simply striate, sometimes marked by a simple ocular node near the antero-dorsal margin; no ridges or other nodes. *Ceratiocaris* McCoy, 1849; *Caryocaris* Salter, 1862; *Hymenocaris* Salter, 1852; *Solenocaris* Meek, 1872; (?) *Colpocaris* Meek, 1872. The last somewhat questionable in character.

2d Section: Carapace similar in form to that of Sect. 1, with the posterior-basal angles produced into spines, and the surface with longitudinal ridges. *Dithyrocaris* Scouler (= *Argas* Scouler).

3d Section: Carapace rounded at both extremities, elongate-elliptical or elongate-ovate in form with a straight dorsal margin; surface concentrically striate, no nodes or ridges. *Lingulocaris* Salter, 1866.

4th Section: Carapace triangular, dorsal margin straight; surface punctate or reticulate, and concentrically striated (growth lines?). *Dictyocaris* Salter, 1860.

5th Section: Carapace suboval or subovate with a straight hinge-line; surface marked with longitudinal ridges or representative nodes and ridges. Surface of parts smooth, punctate, or pustulose. *Echinocaris* new gen.

6th Section: Carapace broadly oval or ovate, no straight cardinal line, consequently no hinge, anterior end rostrated or beaked, surface destitute of nodes or ridges. *Physocaris* Salter, 1860.

7th Section: Carapace composed of three pieces, or apparently of three; two of which are semi-circular, with the anterior end of each obliquely truncate, forming when the two are united, an anterior triangular notch into which the third or rostral plate is inserted. Surface concentrically marked by growth lines; no nodes or ridges. *Peltocaris* Salter, 1866; *Discinocaris* Woodward, 1866; *Aptychopsis* Barrande, 1872; *Pterocaris* Barrande, 1872 (not Heller, 1862).

It will be readily seen from the above synopsis that *Echinocaris* differs materially in the features of the carapace from all the other genera enumerated. The features of the abdomen and caudal parts are not as reliable, but are somewhat distinctive as may be seen by the following table of comparison. (A mark of interrogation indicates that the parts are unknown or only partially known.)

Genus *Ceratiocaris*, abdominal segments 5 or 6, smooth, caudal spines 3.

"	<i>Dithyrocaris</i> ,	"	"	1,	"	"	"	3.
"	<i>Hymenocaris</i> ,	"	"	8,	"	"	"	6.
"	<i>Dictyocaris</i> ,	"	"	6,	"	"	"	3?.
"	<i>Physocaris</i> ,	"	"	5,	"	"	"	3.
"	<i>Echinocaris</i> ,	"	"	4,	spiney,	"	"	3.
"	<i>Discinocaris</i> ,	"	"	4,	?	"	"	3?.
"	<i>Peltocaris</i> ,	"	"	3,	smooth,	"	"	3.
"	<i>Caryocaris</i> ,	"	"	1,	?	"	"	3.
"	<i>Lingulocaris</i> ,	"	"	?		"	"	?
"	<i>Colpocaris</i> ,	"	"	?		"	"	3.
"	<i>Solenocaris</i> ,	"	"	?		"	"	?
"	<i>Aptychopsis</i> ,	"	"	?		"	"	?

The number of segments here allotted to any given genus indicates the maximum number of naked segments known; some of them contain species having a smaller number, and in some a much greater number exists, some of which are concealed within the carapace. Thus *Ceratiocaris* is known to possess in one species fourteen segments in the abdomen, only six of which are naked.

The genus *Dithyrocaris* McCoy, is described as having three longitudinal ridges. This feature is seen only when the two valves are pressed open as in McCoy's example, so as to present the appearance of one large plate; in which case the hinge line forms the middle ridge.

The third or rostral plate in *Peltocaris*, *Caryocaris*, *Discinocaris*, and *Aptychopsis* would appear to be quite analogous to the small rostral plate seen in *Ceratiocaris*, and supposed to exist in *Dithyrocaris*, and perhaps some others, but which is usually absent. It is possible many of the forms may have possessed this rostral plate, at least among those that are deeply notched in front when the valves are spread open. In this case they would as properly be considered as having three plates in the carapace as those grouped under section 7. The forms of this section are usually found with the carapace spread open on the rock, and are then circular and discoid, but when in their natural position would have been more or less roof-shaped.

Colpocaris Meek presents some features that raise a question as to its true affinities. The longitudinal crenulated line and the inflection of the supposed ventral border do not seem to be properly understood; and I am of the opinion they may belong to a different group of Crustaceans.

Echinocaris sublevis.

PLATE XII, figs. 12-14.

Echinocaris sublevis Whitfield, Am. Jour. Sci. and Arts, 3d series, vol. 19, p. 36, 1880.

Carapace obliquely subovate in general outline, the height equal to two-thirds the length, widest and deepest behind the middle, the posterior portion projecting obliquely backwards and downwards beyond the extremity of the hinge-line; dorsal-line straight, forming a hinge-line two-thirds the length of the valve; outer margin of the valves, except on the dorsum, bordered by a narrow, slightly raised and thickened rim; anterior border nearly vertical from the extremity of the dorsal line, for about one-half the width of the valve, except a very slight rounding backward to the hinge-line above; below

it slopes abruptly backward to and along the basal line, and again more abruptly curving around the posterior end of the valve and forward to the extremity of the cardinal line; below which it is distinctly excavated. The portion of the valve which projects beyond the hinge is nearly or quite equal to one-third the length of the valve. Surface of the valves convex, and marked by ridges and tubercles. The principal ridge commences at about the anterior third of the valve, and just above the middle, as an elevated, rounded, and nearly vertical ridge; but soon bends somewhat abruptly, and is directed backward in a broad, sweeping curve, at less than one-third of the height of the valve from the lower margin, and gradually decreasing in strength terminates a little within the margin opposite the longest part of the valve. A second and slightly stronger ridge rises from just behind the middle of the length of the hinge, and descends with a gentle forward curvature, terminates near the upper anterior end of the first one. The anterior or principal tubercle is large and distinct, and situated near the antero-dorsal angle of the valve, occupying the greater part of the space between the front margin and the two ridges just described. Between this and the second ridge the surface is elevated, forming a low tubercle. The surface of the anterior tubercle is occupied by several small but distinct pustules, and the entire surface of the valve covered by a minutely granulose structure.

Abdomen apparently consisting of four free segments; the first one being short and much thicker than the others on the anterior end, but rapidly narrowed posteriorly; the posterior margin being armed with several small spine-like tubercles. The other three segments are shorter than wide, gradually decreasing in strength and increasing in length backwards, the first of the three being apparently less than half as long as wide, their posterior margins all spine bearing; a long curved lateral spine on each side, with three short ones between, and all increasing in length backwards from the first or anterior segment.

Telson proportionally large, of a general triangular form, but slightly protruding at the origin of the movable spines, and projecting behind into a long, slender, and apparently cylindrical spine, making the telson with its spine about as long as the four free segments together. Lateral spines cylindrical, very gently curved, and standing at an angle of about forty-five degrees to the central spine. Surface of the telson highly convex and somewhat angular at the origin of the spine. Surface of the crust of the abdomen smooth.

This species is closely allied in the form of the carapace to *E. punctata* Hall (16th Rep. State Cab. N. Y., p. 74, plate 8, fig. 1); but differs in the form of the nodes and ridges, and in the surface structure, also in wanting the projection at the posterior end of the hinge; if this feature is natural on that specimen. It is probable that the abdomen and telson figured on the same plate under the name *Ceratiocaris armata*, belong to the same species as the carapace of *E. punctata*, as suggested by Prof. Hall in the explanation of plate 23, section Crustacea, Illust. Dev. Fossils; and if so,

the distinction between these parts of the two species is much more marked than between the carapaces.

Formation and Locality.—In small calcareous concretions in the Erie shales (Portage and Chemung) at Leroy, Lake Co., Ohio.

Echinocaris pustulosa.

PLATE XII, fig. 15.

Echinocaris pustulosa Whitfield, Am. Jour. Sci. and Arts, 3d series, vol. 19, p. 38, 1880.

Carapace ovate, widest anterior to the middle, the greatest height equal to three-fourths of the length, hinge-line straight, rather more than half as long as the valve, while nearly one-third the length of the valve projects behind its extremity. Margin of the valve bordered by a narrow, thickened rim. Anterior end of the valve slightly excavated below the hinge extremity, and the margin broadly rounded in front; posterior end more pointed, while the basal line is broadly and evenly curved. At the posterior end of the hinge the margin is also slightly constricted as in front. Surface of the valve convex and marked by the characteristic nodes or ridges. The principal ridge commences in an oval node, which is situated just within the anterior third of the length of the valve; is placed vertically, just above the middle of the height; and the horizontal position, which is sharply elevated and slightly curved, is situated almost in the middle of the width, and terminates a little less than one fourth of the length from the posterior extremity. The second ridge commences at the hinge-line near the middle of its length, and descends with a slightly forward direction to within a very short distance of the top of the vertical portion of the principal ridge. The anterior ridge, corresponding to the anterior node or tubercle of *E. sublevis*, is narrow and nearly vertical; of a slightly sigmoid form, and originates near the anterior extremity of the hinge-line; the lower end reaching more than one-third the depth of the valve. The surface of the ridges and of the valve in the postero-dorsal field, as also of the space below the principal horizontal ridge, is marked by correspondingly large and distinct pustules. Abdomen and telson unknown.

This species differs from *C. sublevis* in its slightly broader form, and in the want of the obliquity of the axis of the valve with the hinge; in the narrower posterior extremity, the pustulose surface, and in the form of the surface ridges; most notably in the anterior one being ridge-like and vertically sigmoid instead of round. The individual used in description is half an inch in length and three-eighths of an inch in its greatest height.

Formation and Locality.—In calcareous concretions in the Erie shales, at Leroy, Lake Co., Ohio.

Echinocaris multinodosa.

PLATE XII, fig. 16.

Echinocaris multinodosa Whitfield, Am. Jour. Sci. and Arts, 3d series, vol. 19, p. 38, 1880.

Carapace elongate-subovate, about twice as long as high, rounded in front and somewhat pointed behind; the basal-line straightened along the middle portion and parallel to the hinge-line; cardinal line straight and nearly half as long as the length of the valve, and a little nearer the anterior than to the posterior end of the carapace. Margin of the valves bordered by a narrow, elevated, thickened rim, which is expanded considerably in width around the anterior end of the valve, and terminates in a rounded, elongated ridge at the posterior extremity of the hinge; from which point the ridge is directed obliquely forward and slightly downward from the caudal line. The surface of each valve is divided into three slightly elevated areas, with depressed sulci between; an anterior, a central, and a posterior one. The first is situated in the middle of the anterior end of the shell; the central one unites with the anterior one below, and extends along the basal margin behind, in a narrow curved point below the posterior one, and projects upward near the centre of the valve in a triangular form, terminating in an elevated point just above the median line. The posterior and largest area is ovate in form, and occupies a little less than one-half the length of the shell, is narrowed in front and pointed behind, taking the form of the extremity of the shell. The centre of the anterior area is slightly tumid. Along the hinge-line and just below its margin there are three subangular tubercles or nodes, at nearly equal distances and of nearly equal strength, except that the posterior one is prolonged at its base into a low, rounded, and slightly curved elevation, which extends to near the point of the central raised area before mentioned. These three nodes, together with the oblique ridge-like one terminating the marginal rim, border the hinge-line on each valve. General surface of the valve finely punctate, but most distinctly so on the posterior field.

The elongated form of the carapace readily distinguished this from any of the other species described, while the number of node-like ridges is a very marked feature. The abdomen and telson of this species have not been observed, although several imperfect carapaces, mostly showing parts of both valves, have been obtained.

Formation and Locality—In calcareous concretions in the Erie shales, at Leroy, Lake Co., Ohio.

DECAPODA.

Associated with the specimens of Entomostraca, described from the concretions of the Erie shales of Ohio, are the remains of a

Macrouran Decapod, which appears to differ so much from any described genus as to make it undesirable to refer it to any of them. One of its peculiarities consists in the possession of a pair of very strong antennal appendages, which project from beneath the anterior end of the thoracic carapace, and are of such size and strength as to raise considerable doubt as to their true nature. The existence of five thoracic limbs, exclusive of these, projecting from beneath the carapace on one side would seem to place their pedal nature out of the question; while their great development as seen on the specimen would indicate that they had served some purpose other than simple antennæ, and to raise the question as to the possibility of their having been chelate at their extremities. As only the basal portions of these organs are represented, however, this question cannot be satisfactorily determined. Having had an opportunity of consulting Dr. A. S. Packard, Jr., in regard to them, he gave as his opinion, that from their position and the representation of the other five pairs of thoracic members without them, they could not be other than antennal in their functions, notwithstanding their great size and anomalous character. Taking this view of their nature, the specimen would conform strictly to the type of Macrouran Decapods.

In its generic relations, as well as in its general expression, the specimen resembles most nearly the genus *Pygocephalus* of Prof. Huxley, first given in the Quart. Jour. Geol. Soc. London, vol. 13, p. 363, 1857, with figures and descriptions of three specimens, under the name *P. Cooperi*. Neither the genus or the species were well characterized at that time. It is however again referred to in vol. 18, p. 420, of the same journal, with a figure of a specimen supposed to be of the same species, much better preserved, from the coal shales at Paisley. There are, however, too many limbs represented as originating from the thorax for a Decapod, and the antennæ, although represented as of large size are not like those of the Ohio specimen, while there is a second pair shown. In other parts the figure is indistinct, and in the description the parts are not defined sufficiently for close comparison. The differences, however, are so great that I shall propose for this form the new generic name *PALÆOPALÆMON*, with the following diagnosis:—

Genus **PALEOPALEMON** Whitfield.

Am. Jour. Arts and Sci., 3d series, vol. 19, p. 40, 1880.

A macrouran decapod crustacean, having a shrimp-like body, with a thoracic carapace narrowed but not rostrate in front, and keeled on the back and sides. Abdomen of six segments terminated by an elongated triangular and pointed telson; segments arched, pleura smooth, not expanded nor lobed, their extremities rounded. Sixth segment bearing caudal flaps, one on each side, composed of five visible elements, the outer four apparently anculosed to form a single large triangular plate on each side of the telson. Thoracic ambulatory appendages elongated, smooth, and filiform, except the upper (second) joint, which is laterally compressed. Abdominal appendages short, the upper joints flattened or convex anteriorly, as if for the attachment of plates or fimbriæ. Antennæ with the basal joints strong and well developed, of large size, much exceeding in strength any of the thoracic limbs. Eye peduncles short.

This is so far as I am aware the most ancient decapod crustacean yet recognized, and on that account alone is of great interest. The character of the caudal plates, in having the parts combined to form a solid plate on each side of the telson, is also an interesting feature, if rightly understood. From the impression of the plate as seen on the ventral side, it was at first supposed to be of a simple element only, but on obtaining an impression in the fragment of rock, chipped from the top or dorsal surface, the obscure lines of the first and second joints were detected, while the outer three are only traceable from the very slight difference in the surface character of two of them, and the thickened substance of the third or marginal one. Of the thoracic limbs only parts have been seen, and of the abdominal members the three anterior ones on one side; the others being concealed by the rock. The eye-stalks appear to have been very short, judging from the spherical cavities beneath the anterior extremity of the carapace, which are small, close together, and shallow.

The earliest form of decapod crustacean previously described, so far as I can ascertain, is given by Mr. Salter in the Quart. Jour. Geol. Soc. London, vol. 17, p. 531, 1861, as *Palæocrangon sociale*; said to be from the Lower Carboniferous limestone of Fifeshire, Scotland. There is another supposed decapod, *Gitocrangon*, noticed by Richter (Beiträge Palæont. Thiring.) from the Upper Devonian, which is mentioned by Salter; but of which he says he is doubtful if it be a crustacean at all. I have not seen the work in which the original description occurs, and can only judge of its nature from Mr. Salter's remarks.

Palæopalæmon Newberryi.

PLATE XII, figs. 19-21.

Palæopalæmon Newberryi Whitfield, Am. Jour. Sci. and Arts, 3d series, vol. 19, p. 41, 1880.

Body slender, the carapace forming a little more than one-third of the entire length, higher than wide, narrowed anteriorly and truncate behind; being longer below than above; median line carinate, with a second carina on each side a little below the crest; anterior end not rostrate but obliquely truncate, and sloping rapidly backward above the truncation, forming, when looked upon in front, a narrow elongated shield-shaped and slightly depressed area, obtusely pointed above and rapidly widening at the base, the lateral carinæ rising from the lower angles; lower posterior angles rounded, basal margins gently curved throughout and bordered by a narrow thread-like band with a narrow groove within it. Abdomen moderately robust, highly arched along the dorsal line, the pleura curving inward below, giving a cylindrical form. Pleura broadly rounded at their extremities on the anterior face, but slightly angular on the posterior corners; posterior margin of the segments strongly arching forward on the back. Telson elongate-triangular, a little less than twice as long as wide, somewhat angular above and marked by a central ridge below, and by a backward curving transverse ridge across the widest part. Caudal flap large, forming a triangular plate on each side, the first and second joints short, subtriangular; marginal plate of the flap thickened, narrow, and elongate, central plate narrowly triangular, a little longer than wide; third or inner plate of equal length with the second, and a little wider than the marginal one; the three combined as one, being apparently anclosed at their margins to form a solid piece. Antennæ very strong, the first joint half as long as the thorax, slightly swollen in their lower half, and flattened on the under side; the other portions unknown. Thoracic limbs very slender and only of moderate length, the second joint laterally compressed, making the height nearly double the width; other joints apparently cylindrical. Abdominal limbs known only by their second (?) joints, which appear to be triangular in form, widening below, flattened and plate-like in character or slightly convex on the anterior face. (In one case only a single thread-like appendage can be seen as if projecting from the outer lower angle.)

Surface of the carapace marked by very fine tortuous and interrupted, raised lines, strongest anteriorly and running obliquely upward and backward; also by a single, slender, distinct, raised ridge, extending more than one-fourth the length of the carapace, originating at the lower anterior angle, and passing upward and backward, with a bifurcation at the anterior third of its length. Surface of the abdomen essentially smooth. Caudal flaps marked by impressed lines, increasing in number and fineness from above downwards.

The following species is introduced for comparison with *Echinocaris*.

ENTOMOSTRICA.

Genus **ARISTOZOE** Barrande.**Aristozoe Canadensis** n. sp.

PLATE XII, figs. 17 and 18.

Carapace of large size, being more than one and a half inches in extreme length, and nearly one inch in height. Form subovate, widest at the anterior end and straightened on the dorsal margin. Hinge-line straight, nearly five-sixths of the entire length of the valve, and reaching nearer to the anterior than to the posterior extremity. Valves very ventricose, but more especially so anterior to the middle. Margin strong and rounded, separated from the body of the valve by a distinct furrow, border narrow in front and along the base, but rapidly widening at the posterior end, and again narrowed toward the posterior extremity of the hinge. Anterior (ocular?) tubercle large, more than one-fourth of an inch in diameter, ovate in form, and narrowest in front, situated close in the antero-cardinal angle; its surface smooth, but capped by a smaller sub-central, nipple-like tubercle. Behind the tubercle, and nearly two-fifths of the length from the anterior end, there is a sharp vertical constriction of the surface, which extends from the hinge to about one-half the width of the valve, where it becomes obsolete. Posterior to this there are two other slight sulci, the anterior of which appears to be slightly curved. Surface of the crust, so far as can be ascertained from the specimen, smooth, except near the lower margin, where it is covered with distant, rounded tubercles of about a twentieth of an inch in diameter each, arranged in three horizontal rows, which decrease rapidly in length from below upward; the upper one containing not more than one-half as many tubercles as the lower or marginal line.

Formation and Locality.—The specimen is an internal cast, in a rather coarse, slightly ferrugineous sandstone. It is said to have come from the Trenton formation in the Ottawa basin of Canada, the exact locality unknown. I introduced it here for comparison with the species of *Echinocaris*, under the impression that it had been described by the late Mr. Billings, of the Canadian survey; but the strictest search has failed to reveal any such description, and I have been obliged to give it a name, notwithstanding the uncertainty of its origin.

SPECIES FROM THE HURON SHALES.

MOLLUSCOIDEA.

BRACHIOPODA.

Genus **LINGULA** Brugiere.

Lingula ligea.

PLATE XI, figs. 3 and 4.

Lingula ligea Hall, Pal. N. Y., vol. 4, pp. 7 and 8, pl. 1, fig. 2.

Shell elongate-oval, widest in the middle, and nearly twice as long as wide, very slightly pointed at the upper end and neatly rounded in front, surface of the valve regularly and evenly convex, and marked only by very fine concentric lines of growth.

In the interior of the shell the median line is marked by an elevated ridge, representing muscular scars, which reaches fully two-thirds the length of the valve. The impression contains four elements, two above and two below, the upper pair enclosing the upper half of the lower. Near the rostral extremity another widely diverging pair of scars are seen, which also appear double.

The specimen is undistinguishable from examples of *L. (D.) ligea* Hall, from New York, where it occurs in the Hamilton and Portage groups. The median line of muscular scars and the diverging rostral scars show that it belongs to the section of the Lingulidæ for which Prof. Hall proposed the generic name *Dignomia*.

Formation and Locality.—In the calcareous nodules from the Huron shales at Delaware, and also from the Erie shale, at Leroy, Lake Co., Ohio, with *Echinocaris*, etc.

Plumulites Newberryi.

PLATE XII, figs. 6-11.

Plumulites Newberryi Whitf., Ann. N. Y. Acad. Sci., 1882, p. 217.

The specimens for which the above specific name is proposed, consist of several detached plates, and of one of several plates,

irregularly folded together in such a manner as to be difficult of interpretation. The several plates vary considerably in form among themselves, and probably represent those from different parts of the body.

The general form of the plates is triangular, with the apex, or initial point of growth, a little inclined to one side; the base, or margin of accretion, is usually the longest side, but not in all cases. One set of plates has the shorter sides diverging at nearly right angles. On this form, the basal line is convex for more than two-thirds its length, and concave on the remaining portion, giving a sigmoidal outline; of the shorter sides, one is straight to near the apex, where it becomes rounded, and the other is slightly concave. Another form has the shorter sides diverging at an angle of about 105 degrees, one slightly convex and the other concave; while the basal margin is convex in two sections, with a constriction or interruption between the two sections, or at about one-third of its length from the straight margin. The plates of this and the preceding form have the surface regularly annulated transversely, parallel to the basal margin, the annulations very fine, and regularly increasing in size and strength from the apex to the base, except in aged specimens, where they are again crowded near the border: five undulations may be counted in an eighth of an inch where strongest. These forms, also, have the straight margin often fractured and bent, as if they had been broken along that side; indicating that two such plates may have been united along this line; and on the only individual showing several plates together, this would appear to be the case. A third form of plate is narrowly triangular or conical, the basal border being the shortest, and simply convex; the other sides being slightly curved throughout, but more distinctly so near the apex, which is obtusely rounded; the lateral margins are of unequal length, and the annulations of the surface finer and more closely arranged than on the other forms.

The individual specimens are much too few in number to give any very satisfactory idea of the general form of the complete body, or of the number of ranges of plates of which it may have been composed. There appears to be no reason, however, to doubt the correctness of the reference of these plates to the genus *Plumulites* Barrande, as their general form and surface structure are exactly like those given by Dr. Barrande, and also to those given in Vol. II, Pal. Ohio, pl. 4, figs. 1 and 2 (*P. Jamesi*), as occurring in the rocks of the Hudson River group, at Cincinnati; while some idea may be obtained of the probable form of the entire body from the outline figure of a European species, represented in fig. 3 of the same plate. These Devonian specimens, however, have been of very much greater size than the above, as the plates here figured are all represented of natural size, the larger individual plates being more

than an inch in transverse diameter, while the species above referred to is minute. The occurrence of forms of this genus in rocks of Devonian age is also a new feature in its history; as those of Europe are confined to the Lower Silurian formations and the lower beds of the Upper Silurian; while these occur above the middle Devonian.

Formation and Locality.—In the Cleveland shale at Sheffield and Birmingham, Erie Co., Ohio.

SPECIES FROM THE MAXVILLE LIMESTONE, THE EQUIVALENT
OF THE ST. LOUIS AND CHESTER LIMESTONES
OF THE MISSISSIPPI VALLEY.

CŒLELENTERATA, RUGOSA.

CYATHOPHYLLIDÆ.

Genus **ZAPHRENTIS** Rafinesque.

Zaphrentis Cliffordana.

PLATE XIII, figs. 1-3.

Zaphrentis Cliffordana Edwards and Haune, Polyp. Foss. Terrains Palæoz.,
p. 329, pl. 3, fig. 5.

Corallum small, measuring from an inch to one inch and a half in height, with a transverse diameter at the summit of from five-eighths to three-fourths of an inch; somewhat regularly tapering and distinctly curved, without distinct varices of growth, but showing slight corrugations of the surface in most individuals. Rays well developed, numbering from thirty to thirty-six in the primary series, with an equal number of secondaries which are much less strongly developed; the primary series extending nearly or quite to the centre of the rather deep calyx. Transverse plates strongly developed. Fosset situated on the inner side, strong, deep, and extending to the middle of the calyx in the specimens seen. Epitheca thin, frequently showing the lines of the rays impressed on its surface.

The species does not attain a very large size, but is a very common form on the surface of the limestone, and is somewhat persistent in character, the greatest variation being in the somewhat more rapid expansion of some examples. The specimens from Ohio accord quite closely with that figured by the authors of the species as cited, and also with specimens from the Chester limestone from several localities in the western States, especially from Chester, Ills.

Formation and Locality.—In the Maxville limestone, at Maxville and Newtonville, Ohio. I found them quite plentiful on the surfaces of blocks of limestone, at Winona Furnace, obtained at Culver's quarry, near Maxville. The originals of the species are cited from Button-mole Knobs, near Louisville (Keokuk limestone); and from Mammoth Cave, Ky. (Chester limestone).

Cyathocrinus Maxvillensis, n. sp.

PLATE XIII, figs. 5-8.

Cyathocrinus inequidactylus Whitf., Ann. N. Y. Acad. Sci., 1882, p. 219.Not *C. inequidactylus* (McCoy) W. and Sp.

Body of rather small size. Calyx deep cyathiform, being nearly hemispherical in one example, and somewhat broad obconical in another, and composed of smooth plates, which have only the general convexity of the body, or very slightly tuberoso. Basal plates minute to moderate size, higher than wide. Subradials large; height and width nearly equal; two of them heptagonal and the others hexagonal, the lower sides barely diverging from a straight line. First radials wider than high, and about two-thirds as high as the subradials. Anals visible, three in number; the first elongate pentagonal, nearly twice as high as wide, and situated a little obliquely on the right side of the area; the other two are small and pentagonal. Second radials, or first arm-plates, smaller than the first radials and narrowing upward, wedge-formed above, and each supporting two arms. On the postero-lateral rays they are long and cylindrical, with the arms slender. On the anterior ray it is short and supports two slender arms; while on the antero-lateral rays they support a slender arm similar to those of the other rays on the anterior side, and on the outer side an arm several times larger and stronger than the others, and composed of larger and stronger plates.

Plates of the arms short and unequal-sided, and giving origin to jointed tentaculæ from the longer side of each plate, which is upon the alternate sides of the arm, or on the same side from every second plate. Surface of the plates smooth. Length of the arms and subsequent bifurcations not known. Column small, round, and composed of unequal-sized plates alternating with each other.

The slender arms are preserved on two individuals to the length of about one inch, and the strong antero-lateral arm on one, to more than an inch; but no evidence of bifurcation appears.

The inequality of the antero-lateral arms will be the distinctive feature of the species, as the form of the calyx is similar to many other species of the group.

Formation and Locality.—In the Maxville limestone (shaly portion), at Newtonville, Ohio.

BLASTOIDEA.Genus **PENTREMITES** Say.**Pentremites elegans.**

PLATE XIII, fig. 4.

Pentremites elegans Lyon, Trans. Acad. Sci. St. Louis, vol. 1, p. 632, pl. 20, fig. 4.

Body small, broadly subpyriform, the length equal to about once and a half the height, but somewhat variable with age; the greatest width being at the

base of the ambulacral areas, or considerable below the middle of the height; the outline of the lower portion being nearly straight lines, or a little concave between the base of the ambulacral areas and the lower extremities of the basal plates; while above the form is generally rounding or convex. In a basal view the form is pentangular, and viewed from above somewhat pentalobate; the ambulacral areas being slightly sulcated. Basal plates small, extending to rather less than half the height of the body below the base of the areas, and in their lower half are somewhat more attenuate than above, the cicatrix for the attachment of the column being very small. Forked plates elongated, and the sinus very broad and deep; the length of the plates being equal to more than once and a half their greatest width, and their summits slightly truncated for the reception of the small-pointed interambulacral plates, which are in length about equal to one-fourth of the entire length of the areas. Ambulacral areas proportionally wide, distinctly depressed along their middle and composed, in the specimen figured, of about twenty-six pairs of transverse poral-plates, from ten to eleven of which occupy the space of an eighth of an inch in length, in the lower and middle portions, but become shorter above. Summit openings rather large, surface smooth.

The examples observed vary considerable in form according to their relative age, the smaller ones being shorter above than that figured, with narrower areas and shorter poral plates, while the diameter is somewhat less. The species is proportionally broader and shorter than *P. pyriformis* Say, although somewhat resembling it, but is sufficiently distinct to be readily recognized.

Formation and Locality.—In the Maxville limestone (Chester group), at Newtonville, Ohio. Collection of Columbia College.

MOLLUSCOIDEA.

BRYOZOA.

Genus **POLYPORA** McCoy.

Polypora Varsouviensis?

? *Polypora Varsouviensis* Prout, Trans. St. Louis Acad. Nat. Sci., vol. i, p. 237, pl. 15, fig. 3.

Some macerated fragments of a species of *Polypora*, very closely resembling this species, have been examined on the surface of thin shaly layers of the Maxville limestones, from Newtonville, Ohio. But the examples are too much worn and too fragmentary for description or illustration. A species of *Fenestella* has also been detected showing only the nonporiferous surfaces of fragments.

The rays are very fine and slender, with slightly elongated, quadrangular fenestrules. The rays are finely striate longitudinally, but too imperfect for use or identification.

***Synocladia rectistyla*.**

PLATE XIII, figs. 9 and 10.

Synocladia rectistyla Whitf., Ann. N. Y. Acad. Sci., 1882, p. 220.

Bryozoum growing in spreading funnel-formed fronds, rising from a rooted base and widely diverging in their upward growth; the inner surface of the cup bearing pores. Rays straight and somewhat rigid in their upward direction, with frequent bifurcations, which are not abrupt with rapidly diverging branches, but rise gradually from a thickened space, and gradually diverge as slender but constantly thickened rays until the normal strength is attained.

The rays are slender, rather closely arranged; about six of them occupying the space of a fourth of an inch in the widest parts, and from eleven to twelve may be counted in the same space in the most crowded parts.

Transverse dissepiments nearly as strong as the longitudinal rays, and often slightly arched upwards between them in the wider parts, but more frequently directed obliquely upward in passing from one ray to the next, and very often directed upward to the right from one side of a ray, and to the left on the opposite side; but they are generally direct in the more crowded portions. The middle of the ray on the poriferous surface is elevated or roof-like, with a central crest or ridge bearing distant nodes; a single row of large pores is arranged on each side, which are usually less than their own diameter apart, and more or less alternating with those of the opposite side. From two to three pores occupy each side of each fenestrule, and the pores are margined by an elevated lip, which on unworn spaces are very prominent. From one to three similar pores, although sometimes of smaller size, occupy the surface of each dissepiment. Non-poriferous surface not observed.

This species is somewhat similar to *S. biserialis* Swallow (Trans. St. Louis Acad. Sci., vol. i, p. 179), as identified and figured by Mr. F. B. Meek (Final Rept. of U. S. Geol. Surv. Neb., pl. 7, fig. 5), but differs in wanting the longitudinal nodose ridge between the pores of the dissepiments, and in having only a single row of pores on those parts occupying the middle of the dissepiment as well as in the more slender, finer, and more direct, and much more crowded rays, also in having a larger number of somewhat smaller pores on the rays. Mr. Meek, *loc. cit.*, identifies the above species with *Synocladia Cestriensis* (*Septipora Cestriensis* Prout, Trans. St. Louis Acad. Sci., vol. i, p. 448, pl. 18, fig. 2), which differs from the Ohio specimens in the stronger and thicker, as well as more flexuose rays; in the rounded fenestrules, and smaller-sized pores, which are

also more abundant, often showing three ranges on parts below bifurcations. On direct comparison of the Newtonville specimens with specimens from Chester, Ill., these differences, especially those pertaining to the mode of growth, are very marked and characteristic.

Formation and Locality.—In the Maxville limestone (Chester), at Newtonville, Ohio. Collected by Prof. E. B. Andrews.

BRACHIOPODA.

Genus **STREPTORHYNCHUS** King.

Streptorhynchus crassum.

PLATE XIII, figs. 11 and 12.

Hemipronites crassum M. and W.

Orthis Lasellensis McChesney, New Pal. Foss., 1859, p. 32, pl. i, fig. 6.

Shell very variable in size and form, but usually more or less plano-convex as seen in profile, somewhat semi-oval in outline, but usually a little too long from beak to base to be strictly so considered. Ventral valve more or less flattened, a little prominent on the umbo, but usually becoming slightly concave toward the front of the shell; cardinal area of moderate height with a covered deltidium; beak more or less distorted. Dorsal valve convex, often quite rotund, but usually depressed convex, with a slightly prominent umbo. Surface of the shell marked by radiating striae of considerable strength, which are sometimes sharply elevated and uniform, but on other specimens may be distinctly alternating in strength or arranged in fascicles; these are crossed by fine concentric striae which give a finely crenulated surface when viewed through a lens. Coarser concentric undulations of growth also mark the shell at irregular distances.

The individuals referred to this species are so extremely variable in all their characters that it becomes next to impossible to properly characterize the species by any kind of verbal description. There are, however, two distinct types of shell included among them, which possess characters sufficiently distinct to indicate. One of these is strongly plano-convex in profile, the dorsal valve being very highly convex, with a large and strong beak, incurved; the ventral valve usually being distinctly concave toward the front margin, and the beak usually more or less distorted and twisted. This form generally attains a considerable size, occurring of a diameter of two and a half or three inches. The other form is much smaller, seldom exceeding one and a half inches in its transverse diameter; the shell is less convex, in fact never very highly rounded, the cardinal area much narrower and the beak less liable

to distortion. These forms usually characterize different beds, and are easily recognized from each other, but among them there are usually intermediate forms associated, which tend to destroy the line of specific distinction, on which account they are usually considered as varieties of the one species; although there is not the least trouble in recognizing the different types in well-marked specimens, still many individuals occur which cannot be satisfactorily referred to either, rendering it impossible to strictly classify them, except as one species.

In placing this species under the genus *Streptorhynchus* King, I do so with the belief that *S. crenistria*, the shell upon which the genus was founded, is generally distinct from *Orthis adspectans* and its congeners, which formed the types of Pander's genus *Hemipronites*; as, besides the strong internal differences, the entire absence of a cardinal area on the dorsal valve of the former shell and those of that group, and the presence of a very well-developed area on that of the latter, together with the difference in the general form of the shell, offer good grounds for generic separation.

Genus **PRODUCTUS** Sowerby.

Productus elegans.

PLATE XIII, figs. 15 and 16.

Productus elegans N. and P., Jour. Acad. Nat. Sci. Phila., vol. iii, 2d series, p. 13, pl. 1, fig. 7.

Productus elegans of Authors.

Productus fusciculatus McChesney, New Pal. Foss. 1859, p. 38.

Shell small, rather below a medium size, highly arcuate, and often much produced in older specimens; hinge-line short, frequently not more than half as long as the width of the shell below. Body of the shell somewhat quadrangular in the upper part, being flattened or even slightly sinuate along the median line, and also flattened on the sides; beak proportionally large and obtuse, not projecting much beyond the line of the hinge when viewed from above; auriculations very small. Visceral cavity proportionally small, the distance between the valves as seen when the front extension of the valves is removed being not more and generally less than half the width of the shell. Dorsal valve slightly concave. Surface of the shell marked by strong fasciculating striae, strongest near the front, often showing some stronger ones with scattered spine bases; spines often most numerous on the sides of the shell near the hinge extremities. The upper portion of the ventral and the surface of the dorsal valve are marked by strong concentric wrinkles, generally distinct, but sometimes quite obscure.

The Ohio specimens of the species are of very characteristic form, so closely resembling those from the limestone at Chester, Ill., that there is scarcely a chance of mistaking them. They are also usually of about the same size with the western specimens, only occasionally an individual occurring of large size; in which case they present the characters of the form described by Mr. McChesney as *P. fasciculatus*. A few individuals have been noticed from the harder and more compact limestone, which are less quadrangular in the upper part, and the striæ appear a little finer and smoother, and the front of the shell in its extension somewhat rounder than the usual form. Some of these peculiarities, especially the smooth finer appearing striæ and apparent absence of spines, are the result of excessive exfoliation, but the difference of form is probably of other origin.

Productus pileiformis.

PLATE XIII, figs. 13 and 14.

Productus pileiformis McChesney, New Pal. Foss., 1859, p. 40.

Comp. *Productus cora* D'Orb.

Shell of medium size, pileiform, highly arcuate from beak to front and rounded from side to side, beak small, somewhat pointed, and the body of the shell somewhat gradually expanding toward the front. Hinge-line usually quite short and inconspicuous; auriculations small or obsolete. Surface of the shell marked by very fine radiating striæ which are even and usually quite smooth or free from spine-bases; increased by implantation on the ventral valve, the added ones at first very small, presenting a strongly alternating character, but soon becoming of full size. The striæ of the dorsal valve does not present this feature on any of the specimens examined. Body of the shell marked in the upper part by numerous strong, irregular and unequal, transverse undulations, a portion of which only are projected entirely across the shell on the ventral side.

There is some question as to the propriety of separating these forms from *P. cora* D'Orb. of the Coal Measures; there are, however, many points of difference as well as many of resemblance, although none of them on either side are very constant beyond limited localities; except perhaps the general form and usually fine striæ. There is perhaps equal reason for uniting with '*P. cora*, *P. tenuicosta* Hall, *P. coriformis* Swallow, and some others; but these names seem useful and convenient in designating those of different horizons and geographical areas; as there are differences between them readily recognized and appreciated by those accus-

tomed to examining them, which cannot be portrayed in a figure or described verbally, but which often serve to detect, or at least aid in detecting the true horizon of beds of rock which would otherwise be left in doubt, and it appears necessary to have some means of referring to or designating such forms when speaking of beds characterized by them. The form under consideration resembles those from the Chester limestone of Illinois, used in the description given by Mr. McChesney, more closely than they do those from the St. Louis limestone, given under the name *P. tenuicosta* by Prof. Hall, which have a larger and more rounded beak and much longer hinge-line; the striæ, however, in its extreme fineness resembles that of the St. Louis limestone specimens.

Genus **SPIRIFERA** Sowerby.

Spirifera (Martinia) contractus.

PLATE XIII, figs. 17-19.

Spirifera (Martinia) glaber var. *contractus* M. and W., Geol. Rept. Ill., vol. 2, p. 298, pl. 23, fig. 5.

Shell of medium size, broad ovate or globular in general form, with highly ventricose or gibbous valves, and a short hinge-line with rounded cardinal extremities. Ventral valve the most gibbous, with a large and strong incurved beak; cardinal area small, one-third or less than one-third as high as long, divided in the centre by a rather wide fissure; hinge-line less than half the width of the shell below, the cardinal slopes strongly and abruptly rounded; centre of the valve deeply impressed by a moderately wide, subangular mesial sinus. Dorsal valve nearly orbicular, moderately convex from side to side; beak small, slightly tumid, projecting slightly beyond the cardinal line; mesial portion somewhat strongly elevated to form the mesial fold, which is of moderate width, not strongly defined at the margins, and does not extend above the middle of the shell. Surface of the valves smooth to the naked eye, but under a magnifier is seen to be marked by fine, obscure, radiating lines and by transverse lines of growth.

All the specimens seen are exfoliated to a greater or less degree, so that the real surface has not been seen. The surface striæ, seen by the aid of a lens, is too strong and distinct not to be a surface character, as they are readily felt by the hand, although not readily visible to the unassisted eye. The shell does not attain a very large size, no specimens examined exceeding one and three-eighths inches in length, by a transverse diameter of about one and one-fourth inches. The shells are somewhat variable in form, being proportionally more or less elongate than the measurements above

given. They also differ much in the size and strength of the mesial elevation and sinus, and in the length of the hinge-line. I have much doubt as to the absolute identity of this shell with the Illinois shells described and figured by Messrs. Meek and Worthen, from the fact that these appear distinctly marked by the radiating striæ, while those from the west are said to be smooth, except for the concentric lines of growth, though occasionally showing faint evidences of obscure radiating lines. The fact that the authors of that species refer it to *Sp. glaber*, which is entirely destitute of radiating lines, would seem to indicate it as different from the Ohio forms.

Spirifera Rockymontana ?

PLATE XIII, fig. 20.

Spirifera Rockymontana Marcou, Geol. N. Amer., p. 50, pl. 7, fig. 4; Feb. 1858.

Spirifera Keokuk Hall, Geol. Rept. Iowa, vol. 1, pt. 2, p. 642, pl. 20, fig. 3; Sept. 1858.

Spirifera Keokuk var. Hall, Ibid., p. 672, pl. 24, fig. 4.

Spirifera Opima Hall, Ibid., p. 711, pl. 28, fig. 1.

Several specimens of a *Spirifera*, of the form referred to *S. Keokuk* var. by Prof. Hall, have been obtained from Newtonville, Ohio, which are so entirely similar to those from the St. Louis and Chester limestones of Iowa, as to be absolutely undistinguishable; the form of the shell, the form and number of the plications, and the minute surface structure being exactly as in those.

The form of the shell will vary from longer than wide to much wider than long, dependent on the extension of the hinge-line. In profile the shell is extremely ventricose, with a strongly enrolled beak; a moderate cardinal area, vertically striated; a well-marked mesial fold and sinus; from seven to ten simple, rounded, or sub-angular plications on each side, and from four to six bifurcating or dividing plications on the fold and sinus. The plications and intervening spaces, when the surface is well preserved, are marked by fine longitudinal lines, showing even on partially exfoliated specimens, and are also crossed by still finer transverse striæ which undulate in crossing the plications, and on perfectly preserved surfaces appear to be minutely setose on their edges.

The species is extremely variable in its general outline, as exhibited among the collections from all of the many localities from which I have examined specimens, especially in the extension of the hinge-line, and the proportional width of the shell below, and also

in the prominence of the mesial fold; but the form of the plications and the character of those marking the fold and sinus are usually the same in all; while the most constant and persistent character, and one I have been able to detect on specimens from almost every locality noticed, consists of the minute structure of the surface. I have lately examined a large number of examples from the limestones and sandstones of the Coal Measures of New Mexico, which correspond exactly with those figured by Prof. Marcon under the name *S. Rockymontana*, and find them showing all the variations in form noticed among the Keokuk, St. Louis, Chester, and Coal Measure limestones of Ohio and the West, and am thoroughly convinced they cannot be separated, even as local varieties, with any degree of safety or satisfaction.

Formation and Locality.—The specimen figured is from the Maxville limestone (Chester), at Newtonville, Ohio.

Genus **ATHYRIS** McCoy.

***Athyris subquadrata*.**

PLATE XIV, figs. 1-3.

Athyris subquadrata Hall, Geol. Iowa, vol. i, pt. 2, p. 703, pl. 27, fig. 2, and p. 708, fig. 118.

Shell small or of medium size, subquadrate in outline and strongly trilobate, very variable in its proportional length and breadth, varying from longer than wide to much wider than long. Valves ventricose, the ventral the most rotund, with the beak more or less prolonged and incurved, the extremity distinctly and rather strongly truncated and perforated by a round foramen of considerable size; the middle of the valve is marked by a rather deep, more or less angular mesial sinus, which extends to the beak, but is faintly marked in the upper third of its length, becoming strong and distinct toward the front where the shell is prolonged and bent upward in a linguulate extension. Dorsal valve most rotund on the umbo, the beak obtuse and incurved; middle of the valve strongly elevated in front, forming an abrupt, rounded, mesial fold, which is not strongly marked posterior to the middle of the length, and scarcely defined in the upper part. On the sides the shell is bent downward, forming on each side of the fold a deep sulcus, outside of which the shell is again inflated or elevated, giving a strongly trilobed form to the front half of the valve. Surface of the shell marked only by concentric lines of growth, which are mostly confined to the anterior portion, and are often very numerous and crowded, giving the shell a much thickened appearance on the margin.

The species is a well-known type of the Chester limestones of Illinois and Kentucky, and is often identified with *Athyris* (*Tere-*

bratula) *ambigua*, of the European Carboniferous rock. The Ohio specimens are equally characteristic in form with any of those from the West, and may be readily distinguished by its strongly trilobate form.

Locality.—Newtonville and Maxville, Ohio.

Genus **TEREBRATULA** Llhwyd.

Terebratula turgida.

PLATE XIII, figs. 21 and 22.

Terebratula turgida Hall, Trans. Albany Inst. vol. iv, p. 6, extract page 6, 1856.

Shell rather smaller than medium size, ovate in general form, the point of greatest width usually below the middle of the length, and the length nearly one-third greater than the transverse diameter; base truncate and slightly emarginate. Valves moderately to highly ventricose, the ventral generally the deepest and sinuate below the middle of the length, often deeply so; beak strong, incurved, obliquely and very distinctly truncate, and perforated by a proportionally large foramen. Dorsal valve highly convex, with an abruptly incurved beak, which passes within the deltidial opening of the opposite valve; front of the valve sometimes convex and sometimes slightly sulcated, causing the emargination or truncation of the base. Shell structure finely punctate, and the surface often ornamented by concentric varices of growth.

The specimens from Ohio are larger than those from the typical locality (Spergen Hill, Ind.), usually are, but not so large as they are sometimes found. They correspond closely in form and general characters, but are not so generally sulcated on the dorsal valve. They are, however, altogether too similar to afford means for specific distinction. The most of the specimens which I have examined from Ohio have been slightly distorted by compression, and in this condition may not afford as many points of difference as more perfect individuals would have done.

Formation and Locality.—In the Maxville limestone at Maxville and Newtonville, Ohio.

MOLLUSCA.

LAMELLIBRANCHIATA.

Pinna Maxvillensis.

PLATE XIV, fig. 5.

Pinna Maxvillensis Whitf., Ann. N. Y. Acad. Sci., 1882, p. 221.

Shell of about a medium size, very acutely triangular in outline, with highly convex valves; the length along the hinge equal to nearly three times the

greatest width. Hinge-line straight, not quite as long as the shell below; anterior end acute; basal margin very slightly arcuate, and the posterior extremity rather broadly rounded; the point of greatest length being at about one-third of the width below the hinge-line. Surface of the shell, except for a short distance within the basal margin, marked by moderately strong, simple radiating plications, about eighteen in number, as counted at the posterior end of the specimen figured, but increasing in number with increased growth; the additions being near the hinge. There are also numerous strong concentric lines of growth parallel to the margin, often forming undulations of the surface.

I find no American species described that closely resembles this one; but *P. flexicostata* McCoy, from the English Carboniferous rocks (British Pal. Foss., p. 499, pl. 3, E, figs. 11-13), is very similar, but has slightly stronger radii, is somewhat broader, and differs in having a longitudinal depression just below the hinge-line, which this species does not possess.

Formation and Locality.—In the Maxville limestone, at Maxville, Ohio. Collection of Prof. E. B. Andrews.

Genus **SCHIZODUS** King.

Schizodus Chesterensis.

PLATE XIV, fig. 4.

Schizodus Chesterensis M. and W., Geol. Rept. Ills., vol. 2, p. 301, pl. 23, fig. 6.

Shell of medium size, transversely subovate in outline, with moderately convex valves and large, strong, incurved, and projecting beaks. Anterior end forming one-third the length of the shell, inflated, and rapidly sloping from the beaks to the longest point, which is near the middle of the height, and rounding backward below; posterior end elongated and narrowed, obtusely pointed at the extremity; basal margin irregularly convex, most strongly arcuate opposite the beaks; postero-cardinal margin sloping somewhat rapidly from the beaks backward, and the cardinal slope rather abrupt. Surface of the shell smooth, except for the fine lines of growth.

The specimen used in the above description was identified by Mr. F. B. Meek, and labelled by him with the name here applied to it. The specimen is slightly distorted and otherwise injured, but in its present condition very closely resembles those described in the Illinois Report. Still on one valve which preserves nearly all of the postero-cardinal slope, the lines of growth would indicate a shell with a much higher posterior end than those above cited; and when better material is obtained it may be necessary to give it another specific name.

Formation and Locality.—In the Maxville limestone, at Maxville, Ohio. Collection of Columbia College.

Genus **ALLORISMA** King.**Allorisma Andrews.**

PLATE XIV, fig. 6.

Allorisma Andrews Whitf., Ann. N. Y. Acad. Sci., 1882, p. 222.

Shell of medium size or smaller, transversely elliptical in outline; the length being about twice the height, and the thickness a little more than two-thirds the height. Valves ventricose, most rotund a little in advance of the middle and along the umbonal ridge, and wedge-shaped posteriorly, as seen in a cardinal view; beaks of moderate size, slightly projecting above the hinge-line, incurved, directed anteriorly, and situated at about one-sixth of the entire length from the anterior end. Cardinal line straight or appearing slightly concave, extending about three-fourths of the length of the shell from the beaks backward, and bordered by a proportionally large and wide escutcheon. Anterior end short, sloping forward from between the beaks, at about an angle of forty-five degrees to the hinge-line, to near the middle of the height of the shell, and then abruptly rounding backward into the somewhat regularly convex basal margin. Posterior end broadly rounded from the point of the umbonal ridge to the extremity of the cardinal line. Anterior end of the shell characterized by a very small lunule. Surface of the shell marked by several strong concentric undulations or folds, which are simple, and regularly increase in size and strength to near the full size of the shell; but near the outer margin of the valves, in the specimen figured, they are smaller and doubled by the interpolation of an intermediate rib. The undulations are crossed obliquely from the beak to the basal margin, just posterior to the middle, by a narrow, almost imperceptible sulcus, and along the crest of the umbonal ridge by a line of low-convex and faintly-marked nodes, one on the surface of each undulation; the posterior umbonal slope is also marked, immediately below the margin of the escutcheon, by a slightly concave sulcus, across which the undulations are more faintly marked than below.

The species is closely allied to *Allorisma clavata* McChesney, and was at first supposed to be identical; but on comparison, it shows so many points of difference that it became necessary to consider it as a distinct species.

Formation and Locality.—In limestone of the age of the Chester group (or Chester and St. Louis combined), at Newtonville, Ohio. Collected by Prof. E. B. Andrews, to whom the species is dedicated.

Allorisma Maxvillensis.

PLATE XIV, figs. 7 and 8.

Allorisma Maxvillensis Whitf., Ann. N. Y. Acad. Sci., 1882, p. 222.

Shell small, the specimen used being a little less than one inch in length, and the height less than half the length. Form of the shell transversely

elongate, and cylindrically oval, the cardinal and basal margins parallel and very slightly curved, and the extremities very nearly equally rounded; beaks small, inrolled, barely projecting above the cardinal line, and situated at about one-fourth of the entire length from the anterior end. Body of the shell very evenly and highly rounded from the cardinal to the basal margins, and almost as convex posteriorly as in front. Umbonal ridge scarcely perceptible, and the umbonal slope convex; escutcheon and lunule not defined; anterior slope abruptly rounded. Surface of the shell marked by faint concentric undulations of unequal strength, but most strongly marked on the posterior end and on the umbonal slope.

The evenly convex and regularly cylindrical form of the shell, together with the inconspicuous beaks and the equal-sized anterior and posterior extremities, are distinguishing features of the species. The shell shows evidence in its form and curvature, in a profile view, of having been slightly gaping behind.

Formation and Locality.—In limestone of the age of the Chester group of Illinois, at Newtonville, Ohio.

GASTEROPODA.

Genus **STRAPAROLLUS** Montfort.

Straparollus similis.

PLATE XIV, figs. 9–11.

Straparollus similis M. and W., Geol. Surv. Ill., vol. 3, p. 285, pl. 19, figs. 4 and 5.

Shell about a medium size, helicoid, with a slightly elevated spire, and a broad open umbilicus in which are exposed portions of several of the volutions. Volutions from four to four and a half in number, moderately increasing in size, flattened on the upper surface, sharply carinate on the upper peripheral angle, and rounded on the periphery and on the basal and umbilical surfaces. Besides the carination on the upper lateral angle of the volution, the larger one often bears a second ridge, of considerable strength, on the middle portion of the lower surface; which, on many of the larger specimens, is developed into a sharply elevated ridge; while on other specimens of similar size it is entirely obsolete. Aperture circular. Surface of the shell marked by fine, closely crowded, transverse lines of growth, presenting a slightly roughened surface under a lens.

A number of the specimens on hand, of both small and large size, are marked on the centre of the periphery by an irregular fringed expansion of considerable width, presenting an appearance similar to what might result from a vertical crushing of the volution and spreading out of this portion of the shell laterally; but as many of them do not possess this character to any extent, it can scarcely be

considered as an organic feature of the species. A single individual among them shows this feature existing on all of the volutions, the outer whorls reaching to just below the expansion.

The shell is of a form common to the Lower Carboniferous formations, and also to those referred to the Waverly group and to the Chemung of New York; species occurring both with and without the revolving carinæ, *E. Hecale* Hall (Illust. Dev. Foss., pl. 16, figs. 12), of the Chemung group, is usually destitute of the ridges, as is also *S. cyclostomus*, of the Burlington sandstones of Iowa and other States. There are forms in the Lower Carboniferous of Illinois, in the St. Louis and Chester groups, showing the carinæ, as does also *Euomphalus* (Strap.) *laxus* White, and *Euomph.* (Strap.) *Utahensis* H. and W., from the Waverly group as represented in the far West. The different species described present slight differences from each other, but are all so closely allied in form as to be not readily distinguishable.

Formation and Locality.—In the Maxville limestone, Chester group, at Newtonville, and near Maxville, Ohio. Collected by Prof. Andrews.

Genus **NATICOPSIS** McCoy.

Naticopsis ziczac.

PLATE XIV, figs. 15 and 16.

Naticopsis ziczac Whitf., Ann. N. Y. Acad. Sci., 1882, p. 223.

Shell small, the greatest diameter of the body-volution, in the only individual seen, being about nine-sixteenths of an inch; and the entire vertical height of the shell only half an inch. The shell is very obliquely ovate in form, and consists of about two and a half ventricose volutions, which increase somewhat rapidly in size to the last one, which forms nearly the entire bulk of the shell. The surface of the shell is ornamented by a series of strong and raised transverse lines, which, on the upper volutions, are simple as far as the suture below, and are directed strongly backward in their passage; but on the body-volution they appear more distant and conspicuous, and are directed strongly backward in their passage for about one-third the vertical diameter of the volution, where they are bent forward at an acute angle, and after continuing for a distance nearly equal to their length above, are again bent backward. Across the middle of the volution, they make two or more zig-zagging bends in vertical lines, forming a revolving band of vertical ridges on the periphery; below this band, the lines are directed forward obliquely, running nearly parallel to the base of the shell.

The peculiarity of this shell consists entirely in the structure of the surface ornamentation, as the general form of the species is

similar to that of many others, but the peculiar zig-zag feature of the ornamenting ridges will at once distinguish it from all other described species. Several ornamented forms of the genus are known from the Coal Measures, but their markings consist of nodes, either promiscuously scattered or arranged in patterns.

Formation and Locality.—In the limestone of the age of the St. Louis and Chester beds of Illinois (Maxville limestone), at Newtonville, Ohio.

Genus **HOLOPEA** Hall.

Holopea Newtonensis.

PLATE XIV, fig. 12.

Holopea Newtonensis Whitf., Ann. N. Y. Acad. Sci., 1882, p. 224.

Shell of medium size, ovate in outline and ventricose, with a moderately elevated spire and extremely ventricose volutions, which increase very rapidly in bulk from the apex. Volutions three and a half to four in number, with strongly rounded surfaces and moderate sutures. Apical angle about seventy degrees. Aperture broad ovate, modified on the inner side by the preceding volution, pointed at the upper end and broadly rounded at the base. Surface of the shell smooth and the substance very thin.

The form of the shell is much like that of a *Macrochilus*, but the substance is much thinner than those usually are, and the base of the columella is not prolonged, nor is there a solid axis; but specimens show satisfactory evidence of having been distinctly and largely umbilicated.

Formation and Locality.—In the Maxville limestone (Chester), at Newtonville, Ohio. Collection of Columbia College, New York.

Genus **MACROCHEILUS** Phillips.

Macrocheilus subcorpulentus.

PLATE XIV, fig. 14.

Macrocheilus subcorpulentus Whitf., Ann. N. Y. Acad. Sci., 1882, p. 224.

Shell small, the specimens observed not exceeding five-eighths of an inch in length, and the diameter rather exceeding half the length; spire conical, the apical angle being about fifty degrees. Volutions about three or three and a half, rapidly increasing in diameter and very ventricose, the last one forming more than half the length and much the greater bulk of the shell; suture deep and well marked. Aperture ovate, short, and oblique. Surface of the shell smooth. Columella not seen.

This species is rather closely related to several forms which have been described from the Coal Measures of the Western States, but differs in the form of the volutions somewhat from any, and in the more regular tapering spire,—those mostly having the body-volutions proportionally enlarged.

Formation and Locality.—In the Maxville limestone (Chester and St. Louis groups), at Newtonville, Ohio. Collected by Prof. E. B. Andrews.

Genus **POLYPHEMOPSIS** Portlock.

Polyphemopsis melanoides.

PLATE XIV, fig. 13.

Polyphemopsis melanoides Whitf., Ann. N. Y. Acad. Sci., 1882, p. 225.

Shell rather below a medium size, elongate-fusiform; the length nearly twice and a half the greatest diameter, when not compressed; spire elevated, pointed at the apex, the apical angle being about thirty-five degrees when uncompressed. The specimen figured gives on measurement thirty degrees in the line of compression, and forty degrees in the opposite direction. Volutions about five and a half, gradually increasing in size, moderately and evenly convex, with distinct sutures. Aperture elongate ovate, widest across the middle, rounded and effuse below and pointed above. Columella not observed. Surface apparently smooth.

The species is nearly of the form of *M. fusiforme* Hall (Geol. Rept. Iowa, vol. i, part 2), from the Coal Measures of Iowa, but is considerably more slender. It is possible it may not properly belong to the genus, as the columella has not been closely observed; but so far as can be determined, it appears to be twisted.

Formation and Locality.—In the Maxville limestone, at Newtonville, Ohio. Collected by Prof. E. B. Andrews.

HETEROPODA.

Genus **BELLEROPHON** Montfort.

Bellerophon sublævis?

PLATE XIV, figs. 20 and 21.

? *Bellerophon sublævis* Hall, Trans. Albany Institute, vol. iv, p. 32.

Shell of a medium size or smaller, subglobose in general form, with a moderately expanded lip around the sides of the aperture. Umbilicus closed, the axis being solid and the aurications thickened at their junction with the body of the shell, covering the central or axial portion. Volutions round and

globular within the auriculations, the inner ones projecting into and strongly modifying the form of the aperture, which is transversely reniform and expanded at the sides, but not in front. Surface of the shell not known from Ohio specimens.

The Ohio specimens referred to this species are all quite imperfect; being imbedded in compact limestone and the shell replaced with crystals of carbonate of lime, they do not give the entire characters, so their correct reference to *B. lævis* Hall is somewhat doubtful. The species as seen on entire individuals from the original locality is slightly keeled on the outer volution, and marked, rather faintly, by curved transverse striæ parallel to the margin of the aperture, and indicates a rather shallow but broad notch in the margin of the aperture.

Formation and Locality.—The originals of the species are from Spërger Hill and Bloomington, Indiana; and the Ohio specimens are known from Newtonville and Maxville, Ohio, in the Maxville limestone.

Bellerophon alternodosus.

PLATE XIV, figs. 17-19.

Bellerophon alternodosus Whitf., Ann. N. Y. Acad. Sci., 1882, p. 225.

Shell of about a medium size, and somewhat subglobose in general form, with an appearance of being slightly flattened on the dorsum in immature specimens; while on the adult forms, the dorsum is marked on the outer half of the body-volution by a double series of rounded nodes, those on one side of the centre alternating with those of the other side, and the inner margins of the two series interlocking with each other. Aperture broadly elliptical, strongly modified by the projection of the preceding volution, on the inner margin. Auriculations largely developed and slightly reflected. Axis very distinctly perforate. Inner lip somewhat callous on the protruding inner volution. Surface of the shell, so far as can be ascertained, marked only by lines of growth, beyond the nodes mentioned.

The species is somewhat similar in general form to *B. Montfortianus* N. and P., from the Coal Measures, in its general form, but does not possess the strong transverse folds nor the carina between the lines of nodes marking the dorsum. It also differs in the alternating positions of the nodes.

Formation and Locality.—In the Maxville limestone at Newtonville, Ohio. Collection of Columbia College, New York.

CEPHALOPODA.

Genus **NAUTILUS** Breynius.**Nautilus (Temnocheilus) spectabilis.**

PLATE XIV, fig. 22.

Nautilus spectabilis M. and W., Proc. A. N. S. Phila., 1860, p. 469.*N. (Endolobus) spectabilis* Geol. Rept. Ill., vol. ii, p. 308, pl. 25, fig. 1.

Shell of medium to large size, composed of several volutions, which increase rapidly in size, and are transversely elliptical in a transverse section; the diameter from side to side being about one-third greater than the dorso-ventral diameter at the same point; the lateral edges being obtusely angular, and the dorsal portion of the section larger and more convex than the inner part, strongly convex and subangular on the back. Inner surface of the volution strongly impressed by the one preceding, which it embraces to near the point of greatest diameter. Umbilicus very broad and deep, exposing each of the inner volutions to just beyond the point of greatest transverse diameter, the umbilical surface of the volutions being moderately convex but quite abrupt. The sides of the volutions are marked by a series of nodes of considerable strength and size, arranged at regularly increasing distances, and occurring, as nearly as can be determined from the example on hand, at about every second septum. The nodes are situated on the crest of the side, and are obtusely rounded and prominent. Septa moderately distant and but slightly bent downward on the dorsum. On a specimen measuring about three inches in its greatest diameter, the whole of which is septate, they are arranged at about one-third of an inch apart, near the outer extremity of the last volution. Siphuncle not observed, and the depth of the septa not ascertained. The surface of a portion of the specimen bears marks of a series of strong varices of growth, which have crossed the dorsum and show a strong retral sinus or notch in the margin of the lip at this point. The varices are seen on the inner portion of the last volution and appear to have been arranged at distances nearly corresponding to the septa at the same place. No other markings of the surface are retained.

The specimen from the Maxville limestone is somewhat smaller than that from the Chester limestone figured by Meek and Worthen (Geol. Ill., vol. ii, plate 25, fig. 1), and varies slightly in having the larger bulk of the volution outside of the line of nodes that occur on the lateral angles; or in other words the dorsal portion is larger than the ventral, though on the inner volutions of the specimen this character is not so distinct. Beyond this slight difference they appear to agree as far as the characters are preserved. The difference between this species and *Nautilus Forbesanus* McChes. (New Pal. Foss., page 63, and accompanying plate 3, fig. 4 a and b),

from the Coal Measures, Mercer Co., Ill., are almost too slight for specific distinctions, where all the examples are internal casts. In the last-named species the bulk of the volution is on the inner side of the line of nodes instead of on the outside as in the one now under consideration, while in the one figured by M. and W. it is very nearly or quite equally divided. Where all other features are the same in all, these would scarcely seem to be of specific importance.

From the strong sinus in the lip on the back of the shell the species has been referred to McCoy's genus *Temnocheilus*, and would be so classed if that division should be retained.

Formation and Locality.—In the Maxville limestone (Chester), near Rushville, Ohio, from the collection of Prof. E. B. Andrews.

Nautilus pauper.

PLATE XIV, fig. 23.

Nautilus pauper Whitf., Ann. N. Y. Acad. Sci., 1882, p. 226.

Shell somewhat below the medium size, and consisting of about two and a half volutions, which increase rather rapidly in size, and are so coiled as to expose almost the entire diameter of the inner coils in the umbilical cavity; the outer one embracing only the dorsal surface of the inner volution. Volutions quadrangular in form, with the lateral diameter only about two-thirds as great as the dorso-ventral diameter; while the dorsal and ventral surfaces are nearly vertical to the plane of the sides, so far as can be determined from the specimen on hand; or possibly the dorsal surface may be slightly rounded. The sides of the shell are marked by a faint, narrow, revolving sulcus bordering the margin of the umbilicus, and by a correspondingly faint ridge close to the dorsal margin; while a much stronger rounded ridge occurs on the surface at about one-third of the width of the volution from the dorsal border. Internal features of the shell not known.

A single individual only of the species has been observed, and is altogether too imperfect to reveal all the features. It consists of the non-septate portion of the shell, in the condition of an internal cast, with the impression of one side of the entire shell; but gives no indications of the septa themselves. The only features indicating its cephalopodous nature, upon which one can rely, are its symmetrical form, and the evidence of a similar ornamentation on the opposite sides; otherwise it might have been supposed to represent a form of *Euomphalus*.

Formation and Locality.—In the Maxville limestone (Chester), near Rushville, Ohio. Collection of Prof. E. B. Andrews.

FOSSILS FROM THE COAL MEASURES.

ECHINODERMATA.

CRINOIDEA.

Genus **CYATHOCRINUS** Miller.**Cyathocrinus Somersi.**

PLATE XV, figs. 4 and 5.

Cyathocrinus Somersi Whitf., Ann. N. Y. Acad. Sci., 1882, p. 226.

Calyx very shallow, being low and spreading; the extreme height to the top of the first radial plates not exceeding one-fourth of the diameter; the sides, above the middle of the subradial plates, gradually and almost evenly curving. Centre of the calyx below deeply impressed, the cavity embracing the basal and inner half of the subradial plates. Basal plates very small, extending but little beyond the circumference of the proportionally small column, and forming by their union a somewhat regular pentagon. Subradial plates of medium size, four of them being equal, and pointed at their upper ends, the upper edges being convex; the fifth plate is larger than the others, and is truncated above by the very small first anal plate, which rests between the adjacent first radials, and has apparently joined three other plates above. The surface of this plate bears a single round granulose tubercle. First radial plates nearly twice as wide as high; their lateral faces being short and uniting with those of the adjacent plate, except on the anal side, where they are separated by the first anal plate. Articulating face for the second radials nearly straight, but deeply grooved. Second radial plates short; that of the anterior ray being cuneiform above, and has supported an arm-plate on each upper sloping surface. The second radials of the other rays have not been fully determined; but on the antero-lateral rays, where partially detached plates remain, they have been quadrangular, as if for the support of other radial plates in a direct series. Surface of the inner half of the subradial plates smooth, while the outer half and the entire surface of the other plates are covered with proportionally large, distinct, irregular tubercles, which are flattened on their surfaces and covered with numerous small, distinct granules. The granules also extend to parts of the intermediate surface. The upper margin of the first radial is bounded by an elevated transverse ridge, which is also granulose.

This species bears considerable resemblance in its general surface-markings to *Eupachyrcrinus tuberculatus* M. and W. (Geol. Surv.

Ill., vol. v, pl. 24, figs. a, b), but the tubercles are very distinctly granulose. It, however, does not possess the structure of *Eupachy-crinus*, having only one small anal plate, the upper end of which projects above the line of the first radials. The only specimen yet obtained of the species measures about three-fourths of an inch in diameter, and is about three-sixteenths of an inch high to the top of the first radial plates.

Formation and Locality.—In the Coal Measures at Carbon Hill, Hocking Co., Ohio. Collected by Mr. Somers, of Columbus, Ohio.

Genus **ZEACRINUS** Troost.

Zeacrinus Mooresi.

PLATE XV, figs. 6–10.

Zeacrinus Mooresi Whitf., Ann. N. Y. Sci., 1882, p. 227.

Form of entire body unknown. Calyx of moderate size and pentagonal in outline, very broadly cyathiform or shallow cup-shaped; the region of the basal plates being impressed, and the radials but moderately curving upward at their outer edges. Basal plates small, forming by their combination a nearly regular pentagon. Subradials proportionally large, wider than high, four hexagonal and one on the anal side heptagonal. Subradials short, but not very broad, twice to twice and a half as wide as long; the cicatrix for the second radials very large and nearly straight. The anal plates, three of which are preserved, are longer than wide. Column small, round, composed near the calyx of alternately small and large plates, with very coarse radiating lines of articulation. Surface of calyx smooth, except a line of granules just within the margin of the subradial plates.

The second radial plates present the strong specific feature of the species, and are large and spine-bearing, as in *Zeacrinus mucro-spinus* McChesney. The spines are long, much thickened, and bulbous in the lower part, presenting in this respect a strong contrast with those of that species. The cicatrix for the attachment of the arm-plates is very large, showing that the plates above were of large size. Arms and dome unknown.

The species has been quite abundant, as the spines are found in great numbers, and vary considerably in size, according to the width of the first radial plates upon which they have rested. But all are thickened and bulbous, and many of them are more than an inch in length. They are seldom found attached to the calyx, but are scattered through the shale in the bed where found.

Formation and Locality.—In shale of the Coal Measures at Carbon Hill, Hocking Co., Ohio. Named in honor of H. Moores, Esq., of Columbus, Ohio, their discoverer.

MOLLUSCOIDEA.

BRACHIOPODA.

Genus **DISCINA** Lamarck.**Discina Meekana.**

PLATE XV, figs. 1-3.

Discina nitida? (Phil.) M. and W., Geol. Ill., vol. v, p. 572, pl. 25, fig. 1.Not *Discina nitida* Phillips, Geol. Yorkshire, vol. ii, p. 221, pl. 11, figs. 10-13.*Discina Meekana* Whitf., Ann. N. Y. Acad. Sci., 1882, p. 228.

Shell of moderate size or larger, circular or subcircular in outline. Dorsal valve convex, with an elevated beak which is directed backward and situated at about one-third of the length of the shell from the posterior margin. Posterior slope slightly concave just below the apex; anterior slope convex. Surface of the shell, when preserved, marked by fine, even, but elevated and regular concentric lines, with flattened interspaces; about ten or eleven of the elevated lines occupy a space of an eighth of an inch on the middle of a shell, being finer within and coarser beyond that point. On the partially exfoliated shell, fine radiating vascular lines are perceptible. Ventral valve flat, discoidal, circular in outline, or perceptibly elongated in some cases; the apex a little more than one-third the length of the shell from the posterior margin. Foramen small, elongate-elliptical, narrow, not extending more than one-fourth of the distance from the apex toward the margin, and the depression somewhat further. Surface marked as in the other valve.

This shell would appear to be identical with the one described and figured by Messrs. Meek and Worthen as *D. nitida?* under the supposition that it was the same as that figured by Prof. Phillips, in the Geol. Yorkshire Coast, vol. ii, pl. 11, figs. 10-13; but it differs very much in outline from those figures, as well as those given by other authors, in its circular form; those being ovate, narrowed behind and widened in front; also, in having the apex much more distant from the margin. They also cite *D. Missouriensis* Shumard, as a synonym of the European species. That author indicates his shell as parabolic in outline; from which statement I should consider it as distinct from the present species.

Formation and Locality.—In the Coal Measures at Carbon Hill and Flint Ridge, Ohio; also in Illinois and Iowa.

Genus **CRANIA** Retzius.**Crania carbonaria.** .

PLATE XV, figs. 11 and 12.

Crania carbonaria Whitf., Ann. N. Y. Acad. Sci., 1882, p. 229.

Shell small, none of the specimens observed exceeding three-eighths of an inch in diameter; subcircular in outline, or varied in form by the outline of the object to which they are attached. Free valve depressed convex, marked by a few concentric lines of growth; attached valve thin, but with a slightly thickened margin. Posterior muscular impressions large and submarginal, the others being nearly central and forming a small elevation just posterior to the middle of the valve.

The shells of this species are found attached to the spines of *Zea-crinus* and other bodies, one of those figured being upon the operculum of *Naticopsis*. They are very thin, and not easily detected in the roughened condition caused by the adhering material in which most of the fossils from these beds are found. Species of this genus are rather rare in the Coal Measures, but very few having been described. *Crania Permiana* Shumard, from the white limestones of the Guadalupe Mts, Texas, is a large form, and probably not a *Crania*, according to the description given. *C. modesta* White and St. John, from the Coal Measures of Iowa, is described as "rather small, finely punctate, smooth, except somewhat strong concentric lines of growth toward the margins. Upper valve moderately convex, umbo oblique, nearly central. Lower valve moderately concave." There would appear to be some similarity between the upper valves of this and the Ohio species; but the remark concerning the lower valve being "moderately concave" throws considerable doubt on their identity, as the lower valve of this species is attached over its entire surface, while that one would appear to be free or partially free, if it is a *Crania*.

Formation and Locality.—In the Coal Measures of Carbon Hill, Hocking Co., Ohio. Collected by H. Moores, Esq., of Columbus, Ohio.

MOLLUSCA.

GASTEROPODA.

Genus **MACROCHEILUS** Phillips.**Macrocheilus regularis.**

PLATE XV, fig. 13.

Loxonema regularis Cox, Geol. Rept. Ky., vol. iii, p. 566, pl. 8, fig. 2, 1857.

Shell of moderate size, fusiform, with an elevated, rapidly ascending spire, which is composed of about nine volutions, and has an apical angle of from twenty to twenty-five degrees, in different individuals when not compressed. Spire, when viewed in front, forming considerable more than half the length of the shell, but when measured on the opposite side forms a little less than one-half the entire length. Volutions slightly convex and in some individuals presenting a slightly shouldered aspect caused by a very slight, almost imperceptible angularity at about the upper third of the exposed part. Greatest diameter of the body-whorl situated a little below the suture and decreasing below. Suture close and not strongly marked. Aperture narrow, elongated, the outer lip sharp and oppressed in the upper part. Columella twisted and marked in the lower part by a single, but very strong twisted fold; anterior end of the lip rimate. Surface of the shell marked only by obscure lines of growth.

The species is one of the most elongated forms of the genus yet recognized from the American Coal Measure strata, and will be readily recognized by the great length of the spine, especially as seen in a front view; while the unusually strong columellar fold will also distinguish it. In most of the specimens observed the body volution appears to contract more abruptly above in its outer half than before, giving a somewhat unsymmetrical feature to this part of the shell. All the examples seen are compressed in the direction of bedding, usually to the extent of one-third of their original diameter or more, and some of them are entirely flattened. This gives them in appearance a much greater apical angle than the living shell really possessed, which may easily mislead one in making a hasty comparison. The longest individual observed measures two inches and five-eighths in length, and has a diameter of the body-whorl of one inch. The shell is considerably flattened except in the upper part of the spire, which shows the diameter of the lower part to have been increased fully one-third. The species was originally described by Prof. T. C. Cox, loc. cit., as a *Loxonema*, and his figure would indicate a shell like *Polyphemopsis*, but feeling uncertain of its accuracy in consequence of the great simi-

larity, I procured the loan of the type specimen, which with but little cleaning shows the columellar fold as strongly developed as any of the Ohio specimens.

Formation and Locality.—In the Coal Measure strata at Carbon Hill, Hocking Co., Ohio. Collected and presented by Mr. H. Moores, of Columbus, Ohio.

Genus **LOXONEMA** Phillips.

Loxonema plicatum.

PLATE XV, figs. 14 and 15.

Loxonema plicatum Whitf., Ann. N. Y. Acad. Sci., 1882, p. 231.

Shell small and slender, spire elevated, presenting an apical angle of about fifteen degrees; composed of about eleven volutions, in the example used and illustrated, which are flattened on the surface in the direction of the spire, and marked by strong vertical plicæ, which are directed a little forward in their passage across the volution from above downward. The body or largest volution, counting from the lip backward, contains fifteen of these plications, and the volutions above contain nearly the same number; those of the several volutions being in line with those on the one below, but set enough back of it to be in line with the slope of the plication. This gives them a somewhat spiral arrangement on the shell, the whole having a twist of about one-fourth of one turn in the length of the shell. On the last volution the plicæ are not distinct much below the bulge of the whorl. Aperture elongate and pointed below. Suture distinct, but not grooved or banded. Columella straight, about half as long as the aperture, solid, and terebra-like; shell without umbilicus.

The species belongs to a group of the genus which has but few representatives in our Coal Measures; and even those that are nearest allied to it appear to differ in the form of the columella, which is somewhat peculiar; and if other species should appear presenting these same characters, it may be necessary to separate them generically from the true *Loxonema*.

Formation and Locality.—In the Coal Measures of Carbon Hill, Hocking Co., Ohio. Collected by H. Moores, Esq.

CEPHALOPODA.

Genus **NAUTILUS** Breyn.

Nautilus Ortoni.

PLATE XVI, fig. 20.

Nautilus Ortoni Whitf., Ann. N. Y. Acad. Sci., 1882, p. 231.

Shell of medium size, and consisting of about two and a half or three closely coiled volutions, but which are not at all embracing; the outer one being

simply in close contact with the medio-dorsal portion of the next within, and exposing nearly the entire dorso-ventral diameter of the shell. Volutions transversely subpentangular, being angularly convex on the back, strongly subangular on the sides, and concave on the abrupt umbilical slope, which forms a somewhat sigmoidal curve resembling an ogree moulding, while the slightly concave ventral surface is quite narrow, and forms a fifth surface. Lateral angles obtuse or round subangular, and ornamented by a series of nodes which are strong and very distinct on the inner coil, broad and rounded on the first part of the last volution, and become obsolete on the outer third. The substance of the shell has been very thick and strong, and the surface shows no evidence of growth-markings or striæ. Septa and other internal features unknown.

The shell resembles somewhat *N. spectabilis* M. and W., but has a smaller number of coils in a shell of corresponding size, while the concavity of the umbilical slope and the subangular back are strong distinguishing features.

Formation and Locality.—In the Coal Measures at Springfield, Summit Co., Ohio. Cabinet of the School of Mines, N. Y. City.

Nautilus (Gyroceras?) subquadrangularis.

PLATE XV, fig. 16.

Nautilus (Gyroceras?) subquadrangularis Whitf., Ann. N. Y. Acad. Sci., 1882, p. 232.

Shell of about a medium size, consisting of two volutions, as seen on the specimen used, which increase somewhat rapidly in size with increased length, and are closely coiled so as to bring them in close contact, but not to be in any degree embracing. The inner volution, however, is coiled in so large a circle that it leaves an opening within it of about one inch in diameter. The shell is at first circular in section, but before the completion of the first coil the form has become modified so as to produce a subquadrangular section, narrowest on the dorsal side, and the second volution becomes distinctly quadrangular, being nearly as wide on the dorsum as across the lateral face; but the angles are all distinctly rounded, and the inner or umbilical margins most particularly so. The inner part of the shell has a line of strong node-like undulations on each dorsal angle, which become obsolete at about the first third of the second volution. Margin of the aperture greatly extended on the sides beyond the line of the inner edge, and apparently sinuate on the back. Septa deeply concave and numerous; those at the base of the outer chamber showing about three chambers in the space of one inch, and gradually decreasing in distance toward the earlier part of the shell. On the quadrangular parts, they are deeply receding on the sides and back, and correspondingly advanced on the angles; a consequence of the quadrangular form on a deeply concave septum. Surface of the shell apparently smooth and the substance thin. Siphon unknown.

The species is peculiar in its quadrangular form, and in the wide opening through the centre; in these characters it differs from any previously described species. It is of a form that is with difficulty placed in the genus *Nautilus*—its characters, so far as the external features are concerned, nearly resembling those of *Gyroceras*—and in the absence of a knowledge of the position of the siphuncle, must remain doubtful.

Formation and Locality.—In limestone of the Coal Measures, at Canfield, Ohio. Collected by H. C. Bowman, and now in the cabinet of the School of Mines, New York City.

The following species are forms which characterize two different beds of chert in the Coal Measures in the Hocking Valley, and are sufficiently pronounced to leave no doubt of their true horizon. These beds have been used as horizons from which to determine the position of the rocks in that vicinity.

MOLLUSCOIDEA.

BRACHIOPODA.

Genus **DISCINA** Lamarck.

Discina Meekana Whitf.

For references and synonym see page 598.

Specimens of this species are not uncommon in both of these chert beds, the imprints only remaining.

Genus **SPIRIFERA** Sowerby.

Spirifera (Martinia) lineata.

PLATE XVI, figs. 3-5.

Spirifera lineata Martin.

Internal casts, of small size, of this shell are quite common in the upper chert layers of the Coal Measures in Hocking County, bearing all the features of the species so far as the casts are concerned, but the matrix was not obtained in a sufficiently perfect condition to yield the external form of the shell. In the black or lower cherts some of the individuals have attained a larger size, one specimen measuring about five-eighths of an inch in transverse diameter. A small individual of the species was obtained in the lower black chert,

at Webb Summit, retaining all the fimbriæ of the surface in a most perfect manner, an enlarged figure of which is given on Plate XVI; fig. 8.

Genus **ATHYRIS** McCoy.

Athyris subtilita.

PLATE XVI, figs. 7-9.

Terebratula subtilita Hall, Stansbury's Rept. Great Salt Lake, 1852, p. 409, pl. iv (by error in text pl. ii), fig. 1 a, b, and 2 a, b. *Terebratula subtilita*, *Athyris subtilita*, and *Spirigera subtilita* of various authors.

Internal casts of specimens of this species, of small size, are common in the upper chert beds of the Coal Measures in Hocking County, Ohio. Individuals have been observed varying in size from less than one-eighth of an inch to more than half an inch in diameter, but all in the condition of casts. The larger specimens, although much smaller than those usually found in the shaly limestones at Greentown and elsewhere in Ohio, nevertheless show distinctly by their markings and the distinctness of the muscular scars that they were adult shells, but probably stunted in growth by unfavorable conditions, as they are perfect in form and markings. The specimen illustrated on Plate XVI, figs. 7-9, is from the cherty layers at Mrs. Banks, in the railroad cutting, Falls Township. The individuals from the black cherts, at Webb Summit, Hocking County, are of larger size, and correspond more nearly with the ordinary forms of the species.

MOLLUSCA.

LAMELLIBRANCHIATA.

Genus **AVICULOPECTEN** McCoy.

Aviculopecten interlineatus.

PLATE XVI, figs. 10 and 11.

Aviculopecten interlineatus M. and W., Proc. Acad. Nat. Sci. Phila., 1860, p. 454; Geol. Rept. Ill., vol. 3, p. 229, pl. 26, fig. 7.

Shell small, subcircular in outline, hinge-line straight, nearly as long as the width of the shell below, and with sharply angular auriculations. Valves very gently convex. Surface of the left valves marked by fine, even, lamellose, concentric striæ; several of which are more strongly and highly elevated,

forming varices at regularly increasing distances. Right valve also marked by similar fine striæ, but with the varices very indistinctly marked, or barely perceptible under a lens.

The species is a very strongly marked one, and very characteristic of the Coal Measures. Mr. Meek describes indications of faint radii between the varices on the examples from Illinois, but which do not appear on specimens from Ohio so far as observed. The right valve figured occurs close by the other, and is evidently of the same individual; the features are very similar, differing only in the absence of the strong concentric varices.

Formation and Locality.—In a thin layer of chert of the Coal Measures, near the farm of Mrs. Banks, Falls Township, Hocking County, Ohio.

GASTEROPODA.

Genus **NATICOPSIS** McCoy.

Naticopsis Ortoni.

PLATE XVI, figs. 12 and 13.

Naticopsis Ortoni Whitf., Ann. N. Y. Acad. Sci., 1882, p. 230.

Shell small, with a somewhat depressed conical spire, which forms an angle of about 105 degrees, and the two and a half to three volutions are obliquely flattened on their upper side, in the direction of the spire; the outer one being marked just below the suture by a barely perceptible concave channel of considerable width, which produces a very slight angularity of the upper part of the volution. Suture-line slightly grooved. Lower side of the volution rounded; umbilicus closed; callus slight; aperture obliquely ovate at the outer margin, but rounded within from the excessive thickening of the shell. Surface of the shell marked by fine, rather equal and somewhat regular transverse striæ of growth, most distinctly marked on the lower half of the volution. On the outer half of the last volution, there occur lines of nodes, very faintly indicated, having a direction opposite to the growth-lines, and becoming fainter and finally imperceptible toward the lower side.

The species resembles *N. nana* M. and W. (Geol. Rept. Ill., vol. iii, p. 365, pl. 32, fig. 4) in size and general form, but differs from it in the greater flattening of the volution in the direction of the spire and in the faintly nodose surface.

Formation and Locality.—In a thin cherty band of the Coal Measures in the railroad cutting at Mrs. Banks's farm, Falls Township, Hocking County, Ohio.

PULMONIFERA.

The existence of shells of terrestrial air-breathing Mollusca in the Coal Measures of this country was first made known in the year 1851, when Sir Charles Lyell and Prof. J. W. Dawson made known their discovery of *Pupa vetusta* in the coal-beds of the South Joggins, Nova Scotia. Since that time there have been several additional species discovered in the same region, and others in the Coal Measures of Indiana. In the Am. Jour. Sci. for November, 1880, Prof. Dawson has given a summary of the species known from the coal formations up to that time, and also described what he supposes to be a similar form from the Devonian plant-beds of St. John, New Brunswick. At the time Prof. Dawson's memoir appeared I was working on the form herein described, from the Upper Coal Measures at Marietta, Ohio, which has proved to be so entirely distinct from any of those previously known that it became necessary to found a new genus (*Anthracopupa*) for its reception, which was published in the above-mentioned journal, February, 1881.

All the species known up to the time of Prof. Dawson's paper were supposed to belong to the inoperculate division of the terrestrial Gasteropods, and had been referred to the HELICIDÆ and PUPINÆ. In making the studies of the Ohio shell I had obtained, through the kindness of John Collette, Esq., State Geologist of Indiana, specimens of the two forms from that State, and in freeing them from the matrix I discovered that the species *Dawsonella Meeki* Brad. possessed not only the reflected and slightly thickened lip described by its author, but that the inner lip and much of the umbilical region were covered by a thickened and flattened callus closely resembling that of *Helicina*, furnishing strong presumptive evidence that it had been provided with an operculum, like those of that genus. If this view of its nature is correct, it would place it with the HELICINIDÆ in the operculate section of the Pulmonifera. The Ohio shell has also some peculiar features that are not recognized among any of the Pupa-form species heretofore described from this formation. It is of small size, and the general form is similar to that of the group of the Pupæ usually referred to the genus *Vertigo*; minute shells with a nearly vertical aperture, armed with several projecting tooth-like points within its cavity. This shell

not only presents these same features, but the additional one of having a small, nearly circular notch in the peristome near the upper end of the outer lip, very closely resembling the minute pore-like notch occurring near the upper angle of the aperture in the genus *Pupina* Vignard; or that seen in *Anaulus* Pfeiffer. This latter feature is not present so far as I am aware in any genus of operculated pulmoniferous shells; at least not in the same degree nor with the same apparent purpose that it occurs in the operculated genera above mentioned. The last volution is also flattened or contracted on the back in a very similar manner to that of *Pupina*, as well as of many of the Pupæ. It would therefore almost seem as if in this little shell, of this early age, there were foreshadowed features that afterwards pertained to these two groups of a later time; although the projecting teeth within the aperture as hereafter described would preclude the possibility of an operculum in this case.

Genus **ANTHRACOPUPA** Whitf.

Am. Jour. Sci., vol. xxi, February, 1881, page 126.

Shell minute, pupaform, with few volutions, the last one unsymmetrical; axis imperforate; aperture large, nearly vertical; peristome thickened, united above by a thin callus on which may occur one or more palatal teeth; other tooth-like projections occur on the inner margin of the lip, and a small, nearly circular notch, resembling that in *Pupina*, deeply indents the inner edge of the outer limb near its junction with the body-whorl. Surface of the shell marked by fine, nearly vertical lines.

Type *A. Ohioensis*.

Anthracopupa Ohioensis.

PLATE XVI, figs. 15-17.

Anthracopupa Ohioensis Whitf., Am. Jour. Sci., Feb. 1881, vol. xxi, p. 126.

Shell small and robust, having a length of about three and one-third mm. with a transverse diameter of about two mm., and consisting of about four volutions, the last one extremely ventricose, except on the outer half, where it is obliquely flattened and contracted, and with the aperture, forms about three-fourths of the entire length of the shell. Aperture large, longer than wide, and broadly rounded at the base; lip thickened, rounded within and forming a flattened thickened rim on the outside; particularly on the lower part. Labial notch situated very near the upper extremity of the lip, regular in shape, and forming nearly two-thirds of a circle. A single tooth-like ridge of moderate size extends inward from the lip at about the middle of the columellar side, and another of greater size projects nearly vertically from the

middle of the callus which coats the body of the volution within the aperture. Umbilical chink small. Surface of the shell marked by fine, nearly vertical, even striæ or lines. Apex apparently mamillated.

Formation and Locality.—In the higher beds of the Coal Measures, near Marietta, Ohio. The specimen figured is in the collection of the School of Mines, Columbia College.

Pupa vetusta and *P. Vermilionensis* are both associated in the material in which they are found with small helicoid shells (*Zonites* and *Dawsonella*), also pulmoniferous in character; but the Ohio shell up to the present time is not known to have any such associate; on the contrary, like the first individuals of *P. vetusta* discovered, it is accompanied in one of the layers in which it occurs, by immense numbers of what appears to be a species of *Spirorbis*, which is so abundant that small hand specimens from which two of the Anthracopupas were obtained appear to be nearly half composed of these shells. The form of the shell is similar to most species of the genus, and has a diameter of nearly one line. Although it occurs packed together in such immense numbers in the rock it has one surface generally more or less flattened as though for attachment to some foreign body, and has I presume during life been attached to marine plants, from which it has fallen as they were decomposed, and thus been amassed on the muddy bottom.

ANNELIDA.

Spirorbis anthracosia.

PLATE XVI, figs. 18 and 19.

Spirorbis anthracosia Whitf., Am. Jour. Sci., Feb. 1881.

Shell minute, planorbiform, composed of from one to two and a half volutions, tube slender, and very gradually increasing in diameter, marked by very fine, irregular encircling striæ, which are often gathered into little knots or points near the border of the open umbilicus. Lower side of the shell more or less flattened as if for the attachment to some foreign substance. Diameter seldom exceeding one line, generally less.

Formation and Locality.—In the higher strata of the Coal Measures, near Marietta, Ohio.

APPENDIX.

Leiorhynchus Newberryi.

LEIORHYNCHUS NEWBERRYI H. and W., 23d Rept. State Cab., N. Y. In the description of this species it is correctly referred to the Chemung group, but improperly to the Waverly group on the plate.

Genus **PHOLADELLA** H. and W.

Preliminary Notice of Lamellibranchiate Shells of the Upper Helderberg, Hamilton, and Chemung groups, etc. (State Cab. Nat. Hist., Dec. 1869, p. 63). The name ("Hall, n. g.") incorrectly inserted without my knowledge.—R.P.W.

Pholadella Newberryi.

PHOLADELLA NEWBERRYI H. and W. Prelim. Notice, cited above, p. 65.
Allorisma (*Sedgwickia*?) *pleuropistha* Meek, Pal. Ohio, vol. i, p. 309, plate 13, Figs. 4a and 4b.

Pleurotomaria Mississippiensis.

PLEUROTOMARIA MISSISSIPPIENSIS White and Whitf., Proc. Bost. Soc. Nat. Hist., 1862, p. 203, vol. 8.

*Pleurotomaria textiliger*a Meek, Pal. Ohio, vol. i, p. 314, plate 13, figs. 7a and b.

NOTE.

The material embodied in the foregoing paper, with the accompanying plates, was originally prepared for, and was expected to form a part of Volume III. of the Palæontology of Ohio, and to be published as a part of the work of the geological survey of that State, then under the directorship of Prof. John S. Newberry; but owing to a change of policy of the State authorities, the volume was never published. Subsequently, a part of the matter was published in the Annals of the Academy of Sciences in March, 1882, under the title of "Descriptions of New Species of Fossils from Ohio," and references made to the volume and plates as prepared for the survey report. Consequently the new genera and species will date from that publication, except a few of the Crustaceans which had been previously published in the Am. Jour. Science for January, 1880, pp. 33 to 42, in conjunction with one hundred and twenty-five copies of an artotype plate distributed with author's copies. In preparing the matter for republication in the Annals at the present time it became necessary to alter the numbering of the plates from one to twelve, as at first made, to five to sixteen; otherwise the matter stands essentially as originally prepared.—R. P. W.

EXPLANATION OF THE PLATES.

• PLATE V.

STREPTORHYNCHUS HYDRAULICUM Whitf. Page 508.

Fig. 1. View of a cast of a ventral valve twice enlarged.

Figs. 2 and 3. Views of a dorsal valve, natural size and enlarged.

SPIRIFERA VANUXEMI Hall. Page 509.

Fig. 4. View of a very large dorsal valve.

Fig. 5. View of a ventral valve, also of large size.

MERISTELLA LÆVIS Vanuxem. Page 510.

Fig. 6. Cast of a ventral valve.

Fig. 7. View from a gutta-percha impression in the mould of a dorsal valve.

MERISTELLA BELLA Hall. Page 510.

Fig. 8. View of a ventral valve.

Figs. 9 and 10. Opposite sides of an internal cast, the first showing indications of the internal spires.

NUCLEOSPIRA ROTUNDATA Whitf. Page 511.

Figs. 11 and 12. Casts of ventral valves.

Figs. 13 and 14. Dorsal and profile views of an internal cast of a large and rotund specimen.

RETZIA FORMOSA Hall. Page 512.

Fig. 15. View of a small dorsal valve.

Fig. 16. View of a ventral valve enlarged. This individual resembles the form common in Tennessee.

RHYNCHONELLA HYDRAULICA Whitf. Page 512.

Fig. 17. View of a cast of a dorsal showing the form of the shell as noticed in several specimens.

PENTAMERUS PES-OVIS Whitf. Page 513.

Figs. 18-21. Views of casts of ventral valves, showing some variations in form.

Fig. 22. Cast of a dorsal valve showing the long and distant processes.

PTERINEA AVICULOIDEA Hall. Page 514.

Fig. 23. View of a left valve showing the general form.

GONIOPHORA DUBIA Hall. Page 514.

Fig. 24. View of a right valve, natural size.

Fig. 25. Cardinal view of the two valves in outline.

Fig. 26. Enlargement of a similar valve.

LEPERDITIA ALTA Conrad. Page 517.

Fig. 27. The right valve of a specimen enlarged showing slight indications of the ocular tubercle.

LEPERDITIA ANGULIFERA Whitf. Page 518.

Figs. 28 and 29. Views of a right and a left valve showing a very slight variation in form.

Fig. 30. Outline profile of the valves united.

EURYPTERUS ERIENSIS Whitf. Page 515.

Fig. 31. View of a head-plate showing the rounded front, the small ocular tubercles, and small single facets between them.

Fig. 32. View of the dorsal surface of the thorax lacking the terminal spine.

PLATE VI.

STYLASTREA ANNA Whitf. Page 520.

Fig. 1. View of the upper surface of a specimen showing the centre of the cells occupied by the transverse tabulæ.

Fig. 2. Longitudinal section showing the external surface of the cell-walls striated by the rays.

Fig. 3. Enlarged transverse section of a single cell to show the vertical inter-radial ridges extending from the sides of the rays. The central portion also shows the tabular plate.

Fig. 4. Vertical section of a part of a large mass, showing the tabulæ and also the side of the vertical rays with vertical ridges and intermediate cystose structure.

Fig. 5. Transverse section of several cells, natural size, and showing the transverse tabulæ.

RHYNCHONELLA RABICOSTA Whitf. Page 522.

Fig. 6. View of the ventral valve of the specimen described.

STREPTORHYNCHUS FLABELLUM Whitf. Page 521.

Fig. 7. View of a ventral valve.

Fig. 8. View of the dorsal valve.

Fig. 9. Cardinal view of the specimen fig. 7, enlarged to two diameters.

RECEPTACULITES DEVONICUS Whitf. Page 519.

Fig. 10. View of the specimen described.

PLATE VII.

ORTHO CERAS NUNTII Hall. Page 526.

Fig. 1. View of a large individual of this species from the white cherty layers of the formation near Dublin, Ohio, showing the general features of the shell, the figure being cut to accommodate the length of the plate. The lower portion of the short section represents the form of the septum at about that position, the shell having been broken near that point.

Fig. 2. Enlargement of the surface from the lower part of the shell.

MACROCHEILUS PRISCUS Whitf. Page 525.

Figs. 3 and 4. View of the aperture showing the straight columella, slightly imperfect at the lower end, and a back view of the same specimen, both enlarged to two diameters.

LOXOKEMA PARVULUM Whitf. Page 526.

Fig. 5. A view of a very perfect specimen enlarged four times.

PLATYCERAS SQUALODENS Whitf. Page 524.

Figs. 6-8. Lateral and vertical views of the specimen described, the lateral showing the form of the base.

GOMPHOCERAS AMPHORA Whitf. Page 530.

Fig. 9. View of the upper part of a specimen showing the deep sinus of the aperture, and the crowding of the septa in the upper part.

DENTALIUM MARTINI Whitf. Page 524.

Fig. 10. View of a specimen retaining the shell and preserving nearly the entire length.

PLATE VIII.

GOMPHOCERAS? HYATTI Whitf. Page 529.

See also Plate IX.

Fig. 1. Side view of an imperfect specimen showing the rapid contraction of the dorsal side toward the aperture.

CYRTOCERAS CRETACEUM Whitf. Page 531.

Fig. 2. Dorsal view of an imperfect specimen, slightly restored in the outer chamber, showing the siphuncle in the lower part. The lirations on the lower part are produced by the advancing scars of muscular impressions.

Fig. 3. Side view of another individual, a part of the separate portion removed to show the siphuncle.

GOMPHOCERAS SCIOTENSE Whitf. Page 531.

Fig. 4. Side view of the outer chamber of the specimens Fig. 13 and 14, on Plate VI, showing the depth of the septum.

GYROCERAS SEMINODOSUM Whitf. Page 533.

Fig. 5. Side view of the specimen described, showing the absence of nodes on the inner whorls. On the dorsum of the outer volution a fragment of the shell remains indicating its thickness.

PLATE IX.

GOMPHOCERAS HYATTI Whitf. Page 529.

Fig. 1. Ventral view of the specimen figured on Plate VIII showing the breadth of the specimen.

GOMPHOCERAS SCIOTENSE Whitf. Page 531.

Fig. 2. Diagram showing the form of the aperture and its relation to the body of the shell as seen in a top view of the specimen figured on Plate X.

PLATE X.

MYTILARCA PERCARINATA Whitf. Page 523.

Fig. 1. Vertical view of a left valve, the extremity of the hinge is restored in outline.

Fig. 2. View of the anterior side of the shell showing the depth of the shell.

TREMATOCERAS OHIOENSE Whitf. Page 528.

Fig. 3. Lateral view of the specimen used for description showing the line of nodes formed by the closing of the perforations, the upper one being in the outer chamber was not entirely closed.

Fig. 4. Section of the lower end of the specimen showing the form of the siphon.

GOMPHOCERAS SCIOTENSE Whitf. Page 531.

Figs. 6 and 7. Front and lateral views of the specimen showing the form and the septa. For other figures see Plates VIII and IX.

GYROCERAS COLUMBIENSE Whitf. Page 532.

Fig. 8. Lateral view of an imperfect internal cast of a specimen of about the usual size showing indications of the arrangement of the septa.

PLATE XI.

LINGULA MANNI Hall. Page 546.

Figs. 1 and 2. Views of two different individuals varying slightly in size.
From near Dublin, Ohio.

LINGULA LIGEA (?) Hall. Page 547.

Figs. 3 and 4. View of a specimen natural size and enlarged.

DISCINA MINUTA Hall. Page 547.

Fig. 5. View of a lower valve enlarged to three diameters.

Fig. 6. View of an upper valve enlarged to the same extent.

DISCINA LODENSIS Hall. Page 547.

Fig. 7. View of a lower valve, natural size.

CHONETES REVERSA Whitf. Page 549.

Fig. 8. View of the specimen described showing the general form and the cardinal spines.

Fig. 9. Enlargement of the surface to show the alternating striae.

CHONETES SCITULA Hall. Page 548.

Fig. 10. View of a specimen referred to this species, the diagram at the side shows the depth and curvature of the valves.

LEIORHYNCHUS LIMITARIS Vanuxem. Page 550.

Fig. 11. A view of a ventral valve, natural size.

GILBERTSOCRINUS SPINIGERUS Hall. Page 553.

Fig. 12. View of the anterior side of the specimen.

SPIRIFERA ZICZAC Hall. Page 554.

Fig. 13. View of a ventral valve, the surface exfoliated.

SPIRIFERA MAIA Billings. Page 549.

Fig. 14. View of a cast of a dorsal valve.

PTERINEA SIMILIS Whitf. Page 551.

Fig. 15. View of a left valve showing form and surface markings.

AVICULOPECTEN? EQUILATERA Hall. Page 551.

Fig. 16. View of an impression of a left valve enlarged.

PTERINEA FLABELLA Conrad. Page 555.

Fig. 17. View of a left valve, restored on the anterior margin.

NYASSA ARGUTA H. and W. Page 558.

Fig. 18. View of a right valve showing the general form.

GRAMMYSIA BISULCATA Conrad. Page 559.

Fig. 19. A right valve, natural size.

ACTINODESMA SUBRECTA Whitf. Page 557.

Fig. 20. Impression in the stone of a left valve.

PLATE XII.

LINGULA LIGEA Hall. Page 573.

Fig. 1. View of a specimen from the HURON SHALES at Delaware, Ohio.

Fig. 2. The same enlarged, to show muscular imprints.

ORTHIS TIoga Hall. Page 561.

Fig. 3. View of a concretion containing valves of two individuals, natural size.

PALÆANEILO SIMILIS Whitf. Page 561.

Fig. 4. Side view of the specimen described, natural size.

Fig. 5. Cardinal view enlarged showing impressions of teeth.

PLUMULITES NEWBERRYI Whitf. Page 573.

Fig. 6. A small plate of the prevailing form.

Fig. 7. An elongated plate probably from near the extremity of the body.

Figs. 8-10. Three plates, showing as many forms.

Fig. 11. View of a conical plate which overlies a second, from a concretion.

ECHINOCARIS SUBLEVIS Whitf. Page 565.

Fig. 12. View of one side of a concretion showing a part of a valve and the abdomen and telson of this species, natural size.

Fig. 13. View of the left side of a carapace as taken from the other half of the same concretion as Fig. 12, enlarged.

Fig. 14. The abdomen and telson enlarged from the specimen Fig. 12.

ECHINOCARIS FUSTULOSA Whitf. Page 567.

Fig. 15. The right valve of a carapace enlarged.

ECHINOCARIS MULTINODOSA Whitf. Page 568.

Fig. 16. Dorsal view of both valves of a carapace, natural size.

ARISTOZOE CANADENSIS Whitf. Page 572.

Fig. 17. Dorsal view of the specimen described, natural size.

Fig. 18. Lateral view of the same showing the three rows of small pustules near the basal margin.

PALÆOPALÆMON NEWBERRYI Whitf. Page 571.

- Fig. 19. Lateral view of the specimen enlarged to two diameters, showing the parts described.
- Fig. 20. Posterior view of the last abdominal segment and telson as seen on the specimen, in impression of the under surface.
- Fig. 21. View of the upper surface of the same as obtained from the matrix by gutta-percha, both enlarged as Fig. 19. The figures indicate the different elements of the caudal flap.

PLATE XIII.

ZAPHRENTIS CLIFFORDANA Ed. and HAIME. Page 576.

- Fig. 1. View of an imperfect specimen showing the interior of the cup.
- Fig. 2. Lateral view of another and smaller specimen.
- Fig. 3. Enlarged transverse section of a specimen just below the bottom of the cup.

PENTREMITES ELEGANS Lyon. Page 577. .

- Fig. 4. Lateral view of a specimen from Newtonville, Ohio.

CYATHOCRINUS MAXVILLENSIS Whitf. Page 577.

- Fig. 5. View of the anal side of a small specimen showing the long second radial plates and anal series, enlarged to two diameters.
- Figs. 6 and 7. Anterior and posterior sides of another individual showing the thickened outer arm of the antero-lateral ray and the small second radials of the anterior ray, natural size.
- Fig. 8. Anterior view of a third specimen, natural size, showing the thickened lateral anus.

SYNOCLADIA RECTISTYLA Whitf. Page 579.

- Fig. 9. View of the inside of a frond, natural size, showing the straight rigid rays.
- Fig. 10. Enlargement of a portion of the celluliferous surface showing the arrangements of the cells.

STREPTORHYNCHUS CRASSUM M. and W. Page 580.

- Figs. 11 and 12. Impression of a ventral valve and a dorsal valve retaining the shell, the former showing the flattening of the umbonal area.

PRODUCTUS PILEIFORMIS McChesney. Page 582.

- Figs. 13 and 14. Front and profile views of a specimen referred to this species.

PRODUCTUS ELEGANS N. and P. Page 581.

- Figs. 15 and 16. Two views of a specimen of this species of characteristic form.

SPIRIFERA CONTRACTA M. and W. Page 583.

Fig. 17. Dorsal view of the type specimen from the Chester limestone of Illinois, introduced for comparison.

Figs. 18 and 19. Dorsal and profile views of a specimen from the Maxville limestone, at Newtonville, Ohio.

SPIRIFERA ROCKYMONTANA (?) Marcou. Page 584.

Fig. 20. View of a ventral valve showing rather stronger plications than most individuals.

TEREBRATULA TURGIDA Hall. Page 586.

Figs. 21 and 22. Dorsal and profile views of a specimen from Newtonville, Ohio. The figures are slightly restored on the lower part.

PLATE XIV.

ATHYRIS SUBQUADRATA Hall. Page 585.

Figs. 1 and 2. Dorsal and front views of a specimen of the prevailing form.

Fig. 3. Dorsal view of a specimen with a more strongly marked fold.

SCHIZODUS CHESTERENSIS M. and W. Page 587.

Fig. 4. View of a left valve, from Maxville, Ohio, formerly identified and labelled by F. B. Meek.

PINNA MAXVILLENSIS Whitf. Page 586.

Fig. 5. View of a left valve slightly restored at the apex.

ALLORISMA ANDREWSI Whitf. Page 588.

Fig. 6. View of a right valve from Newtonville, Ohio. The figure is slightly restored on the borders.

ALLORISMA MAXVILLENSIS Whitf. Page 588.

Fig. 7. View of a right valve, natural size.

Fig. 8. View of a specimen retaining both valves, one of which is slightly larger than the other, perhaps accidentally so.

STRAPAROLLUS SIMILIS M. and W. Page 589.

Figs. 9-11. Lateral, vertical, and basal views of a specimen showing the irregularly expanded carination on the middle of the shell.

HOLOPEA NEWTONENSIS Whitf. Page 591.

Fig. 12. Side view of the specimen from which the description was drawn.

POLYPHEMOPSIS MELANOIDES Whitf. Page 592.

Fig. 13. View of a specimen showing the form and proportions.

MACROCHEILUS SUBCORPULENTUS Whitf. Page 591.

Fig. 14. View of the aperture.

NATICOPSIS ZICZAC Whitf. Page 590.

Figs. 15 and 16. View of the back of the shell, natural size and enlarged, showing the peculiar surface markings.

BELLEROPHON ALTERNODOSUS Whitf. Page 593.

Figs. 17-19. Three views of the same specimen, which is slightly imperfect.

BELLEROPHON SUBLEVIS Hall. Page 592.

Figs. 20 and 21. Back and profile views of a specimen from which the shell is mostly removed. The auricularia being only partially preserved and the front removed.

NAUTILUS (TEMNOCHEILUS) SPECTABILIS M. and W. Page 594.

Fig. 22. Lateral view of the inner septate portion of a specimen from near Rushville, Ohio, showing the character of the shell.

NAUTILUS PAUPER Whitf. Page 595.

Fig. 23. View of the specimen described showing the outer chamber and impression of the inner coils.

PLATE XV.

DISCINA MEEKANA Whitf. Page 598.

Figs. 1 and 2. Vertical and profile views of an upper valve from Carbon Hill, Ohio.

Fig. 3. Vertical view of another imperfect specimen.

CYATHOCRINUS SOMERSI Whitf. Page 596.

Fig. 4. Basal view of the specimen, natural size.

Fig. 5. Enlarged radial plate showing the character of the nodes.

ZEACRINUS MOORESI Whitf. Page 597.

Fig. 6. Basal view of a calyx.

Fig. 7. Anal view of the same.

Figs. 8 and 9. Lower and lateral views of a second radial plate showing the character of the spine. The specimen bears a valve of *Crania carbonaria*.

Fig. 10. Lateral view of a more slender spined plate.

CRANIA CARBONARIA Whitf. Page 599.

Fig. 11. View of a valve of *Schizodus amplus* Meek and Worthen, bearing a number of attached valves of this species.

Fig. 12. Another lower valve parasitic on the operculum of *Naticopsis altonensis* var. *giganteus* M. and W.

MACROCHEILUS REGULARIS Cox. Page 600.

Fig. 13. Front view of a specimen from Carbon Hill, Ohio.

LOXONEMA PLICATUM Whitf. Page 601.

Fig. 14. Lateral view of a specimen, natural size.

Fig. 15. View of the last volution enlarged.

NAUTILUS (GYROCERAS ?) SUBQUADRANGULARIS Whitf. Page 602.

Fig. 16. Lateral view of the specimen showing the features of the species as far as known.

PLATE XVI.

The figures on the upper half of the plate illustrate the fauna of the Coal Measure Cherts of Hocking County, Ohio.

DISCINA MEEKANA Whitf. Page 603.

Fig. 1. View of a lower valve from the black chert beds.

Fig. 2. View of a more nearly entire valve from Flint Ridge. See lower left corner of plate.

SPIRIFERA (MARTINIA) LINEATA Martin. Page 603.

Figs. 3, 4, and 5. Dorsal, ventral, and front views of an internal cast from the yellow cherts.

Fig. 6. View, enlarged to two diameters, of a partial cast from the black chert. The specimen shows the setæ where the shell is retained.

ATHYRIS SUBTILITA Hall. Page 604.

Figs. 7-9. Dorsal, ventral, and profile views of an internal cast of this species.

AVICULOPECTEN INTERLINEATUS M. and W. Page 604.

Figs. 10 and 11. Views of an imperfect left and right valves as obtained by gutta-percha from the casts in the yellow cherts.

NATICA ORTONI Whitf. Page 605.

Figs. 12 and 13. Front and back views, enlarged to two diameters, of a specimen from the yellow cherts.

Fig. 14. Diagram of the aperture as shown by the breaking of the shell back of the aperture, showing the thickened shell.

ANTHRACOPUFA OHIOENSIS Whitf. Page 607.

Fig. 15. View, greatly enlarged, of the back of the shell.

Figs. 16 and 17. Similar views of the front and side showing the apertural features and thickened lip.

SPIROBIS ANTHRACOSIA Whitf. Page 608.

Figs. 18 and 19. Upper and lateral views, greatly enlarged, of a specimen of the prevailing form.

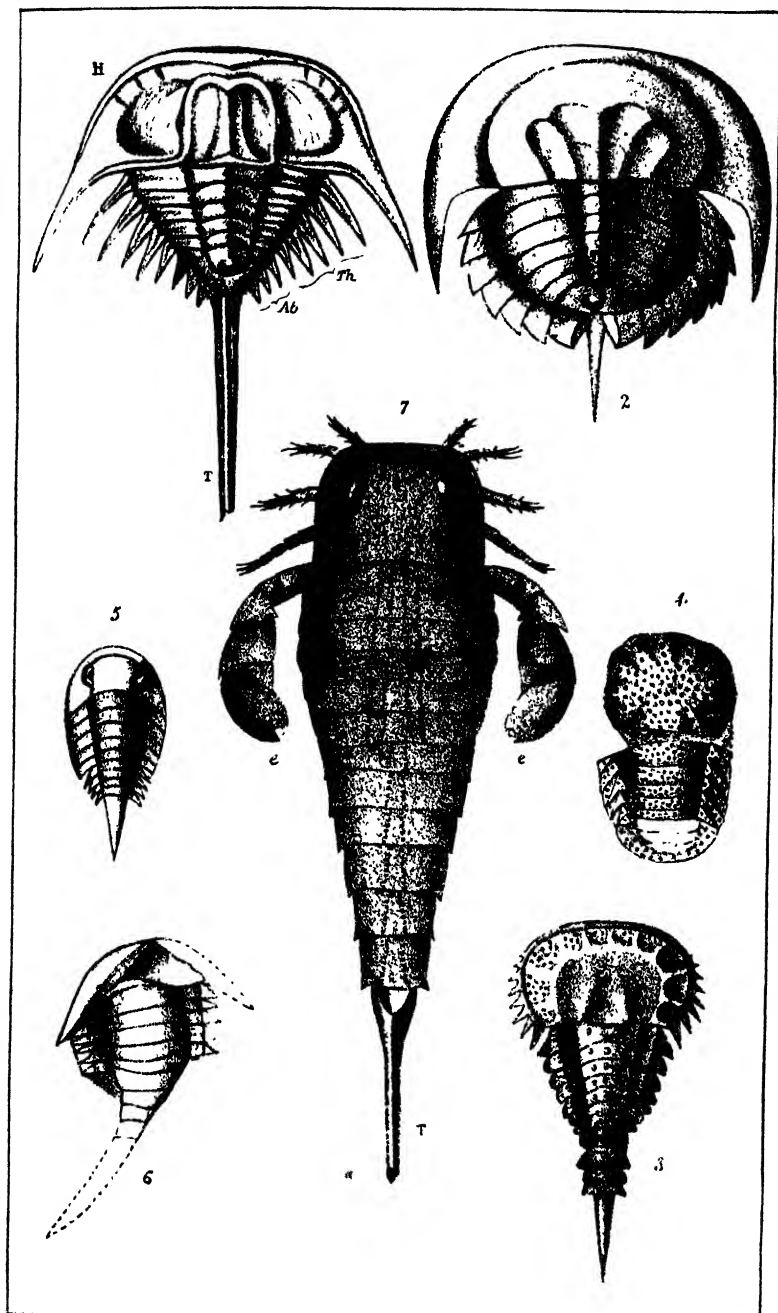
NAUTILUS ORTONI Whitf. Page 601.

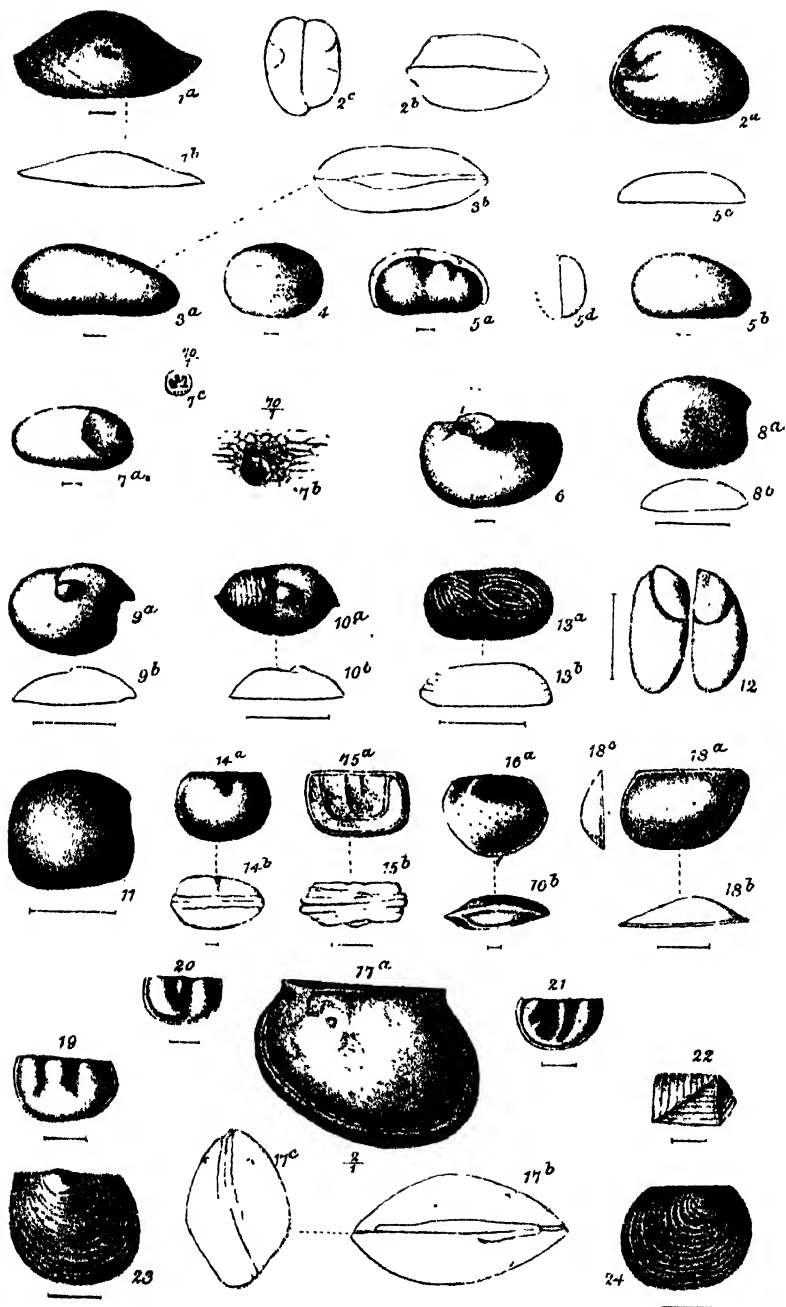
Fig. 20. Lateral view of the specimen described showing the characters of the shell.

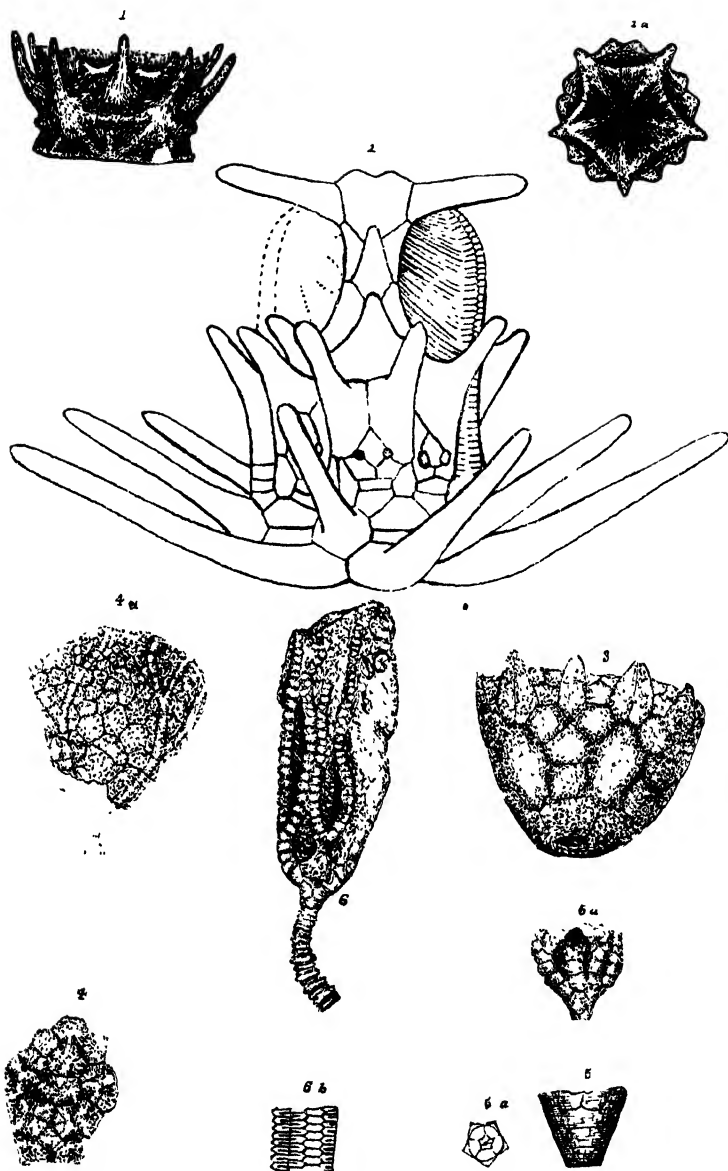
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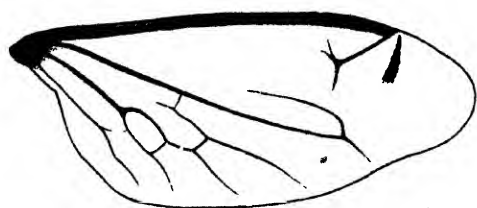
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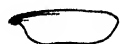




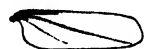




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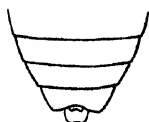
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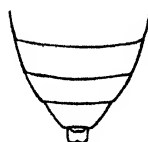
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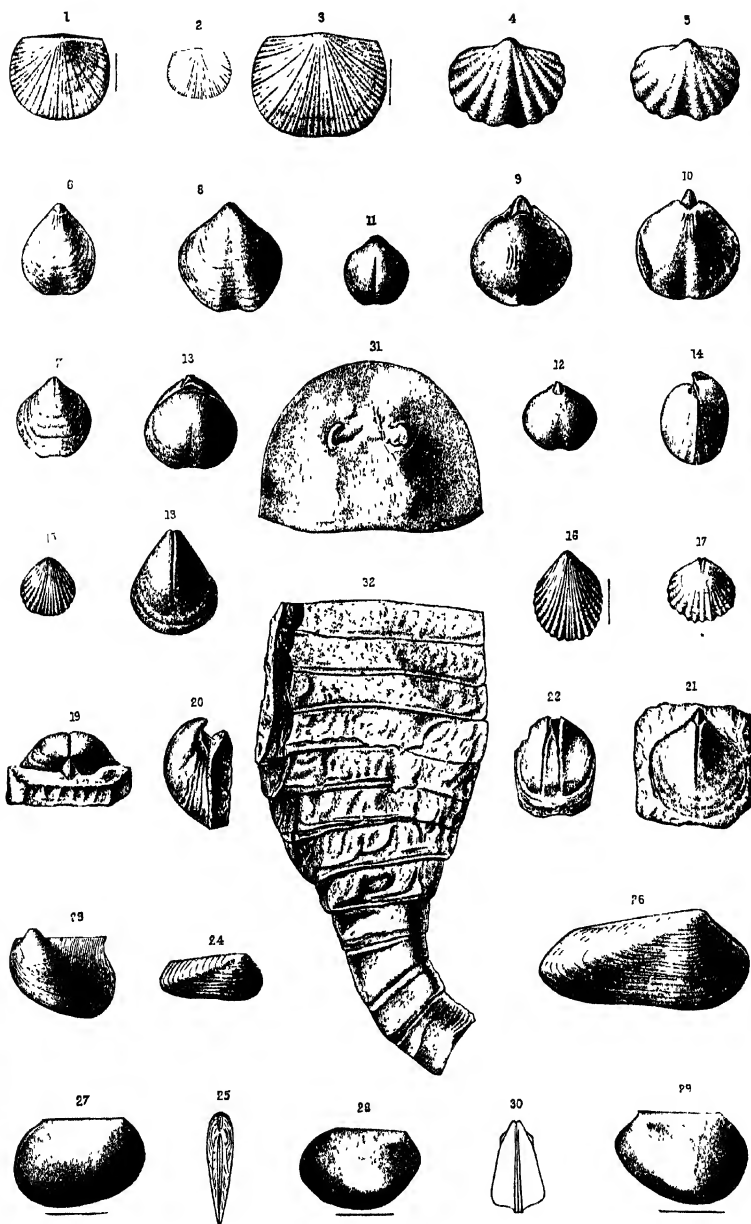


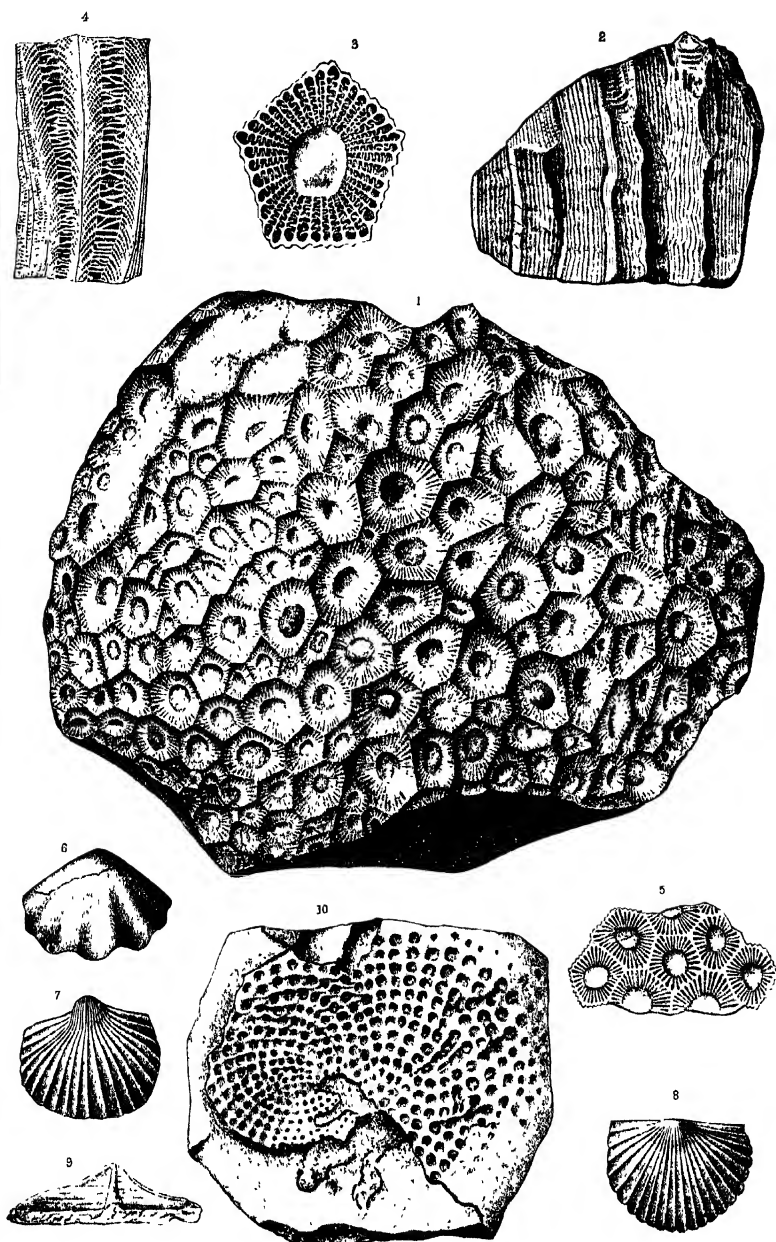
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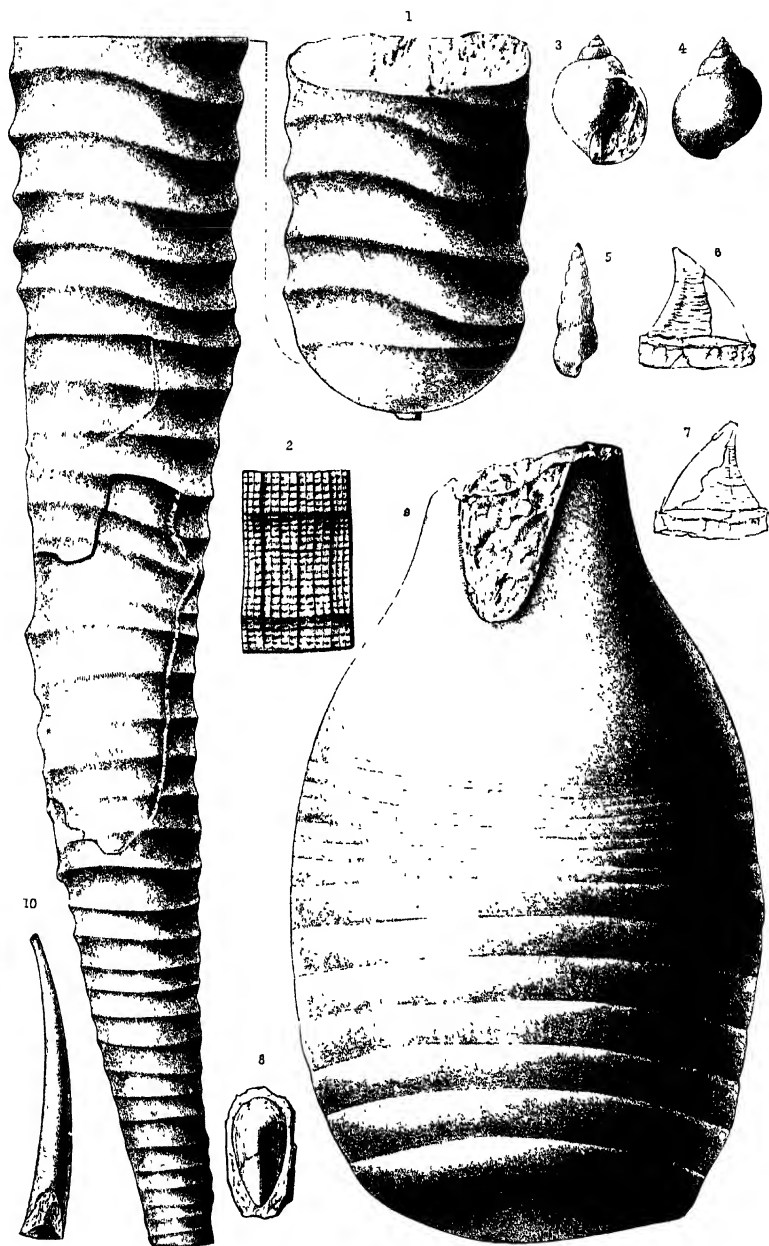


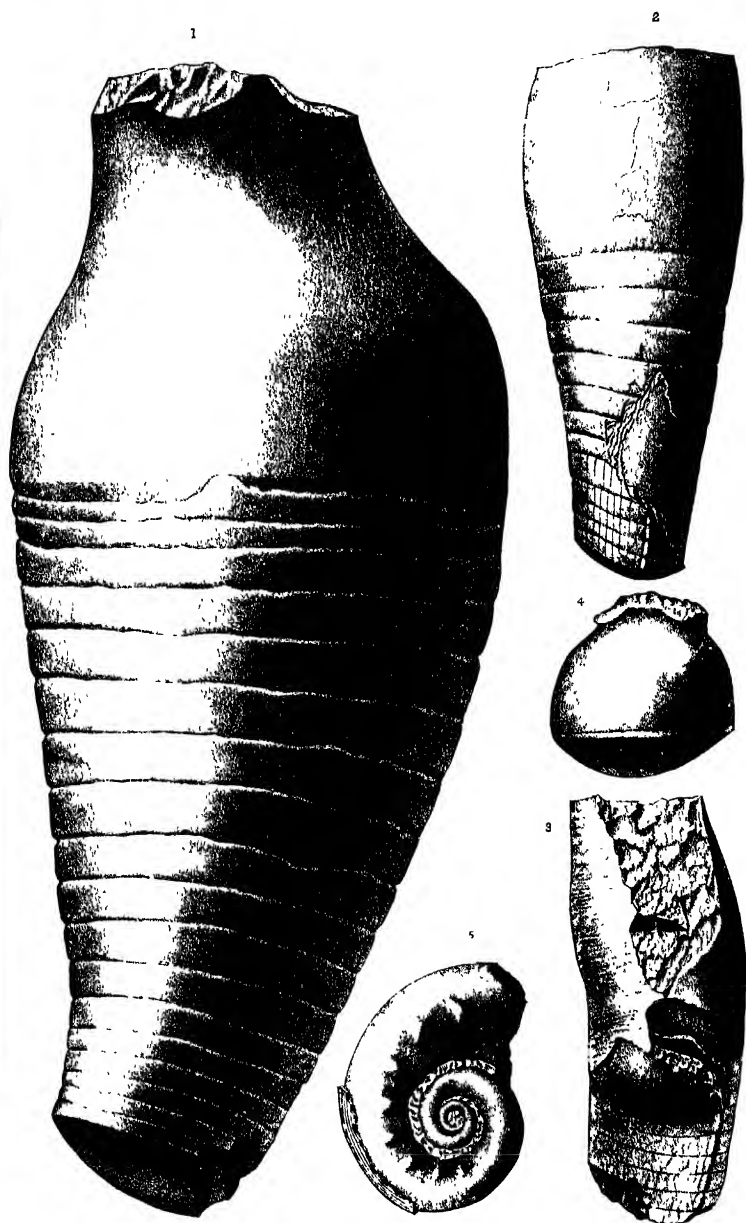
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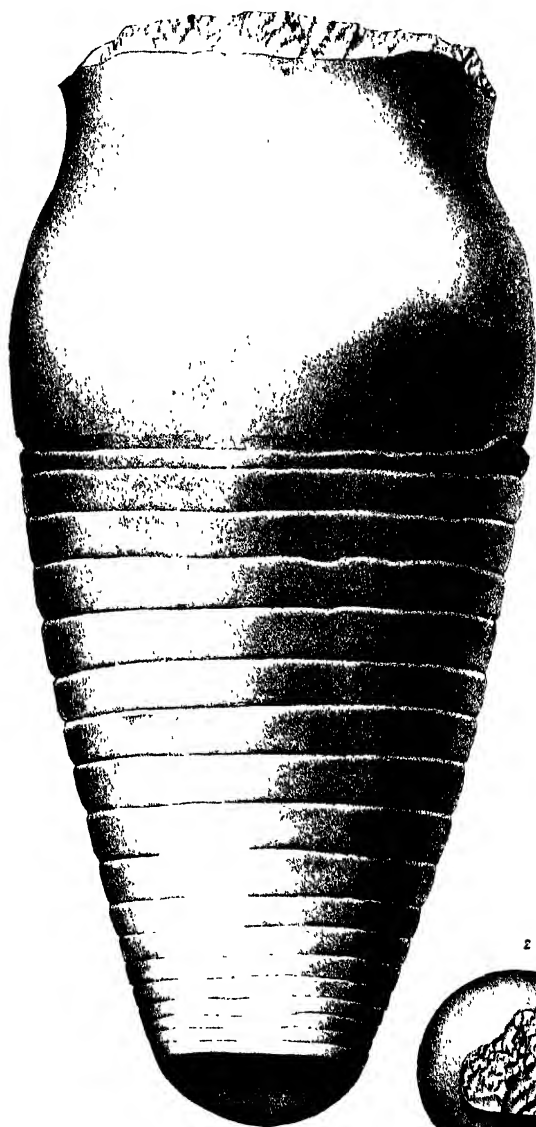




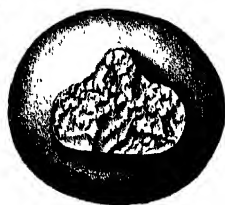


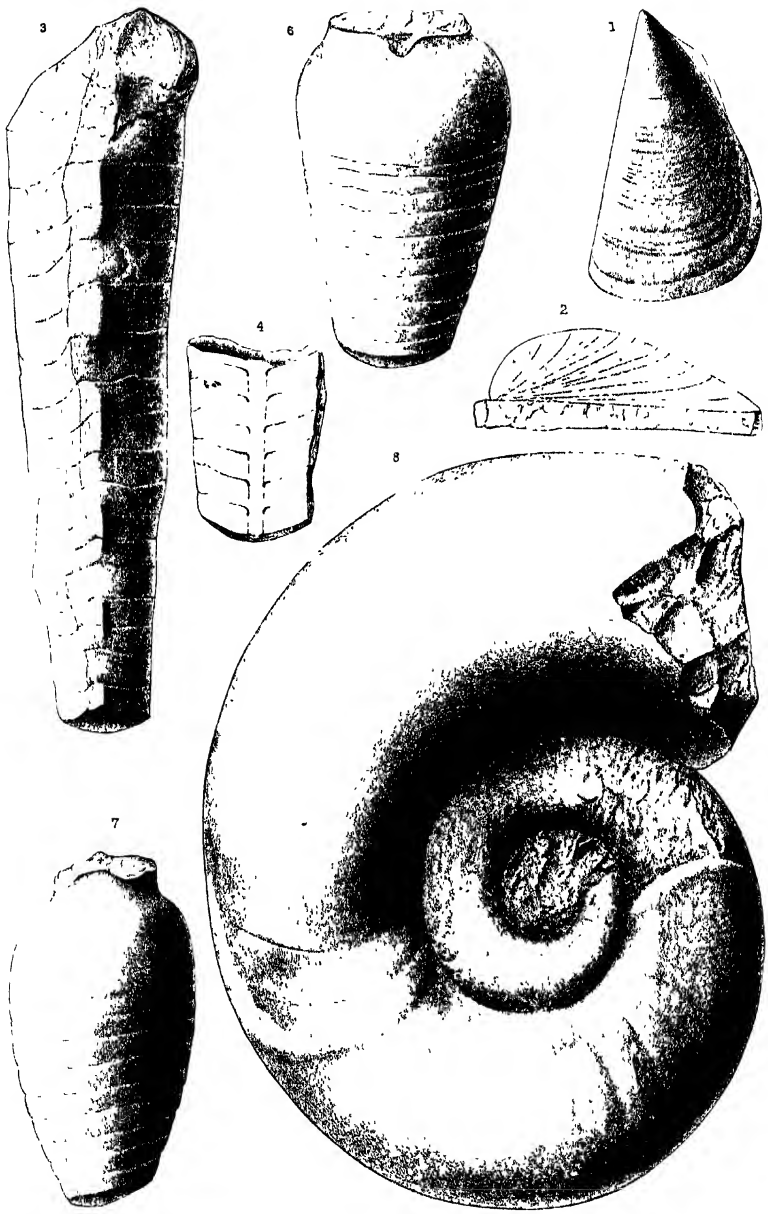


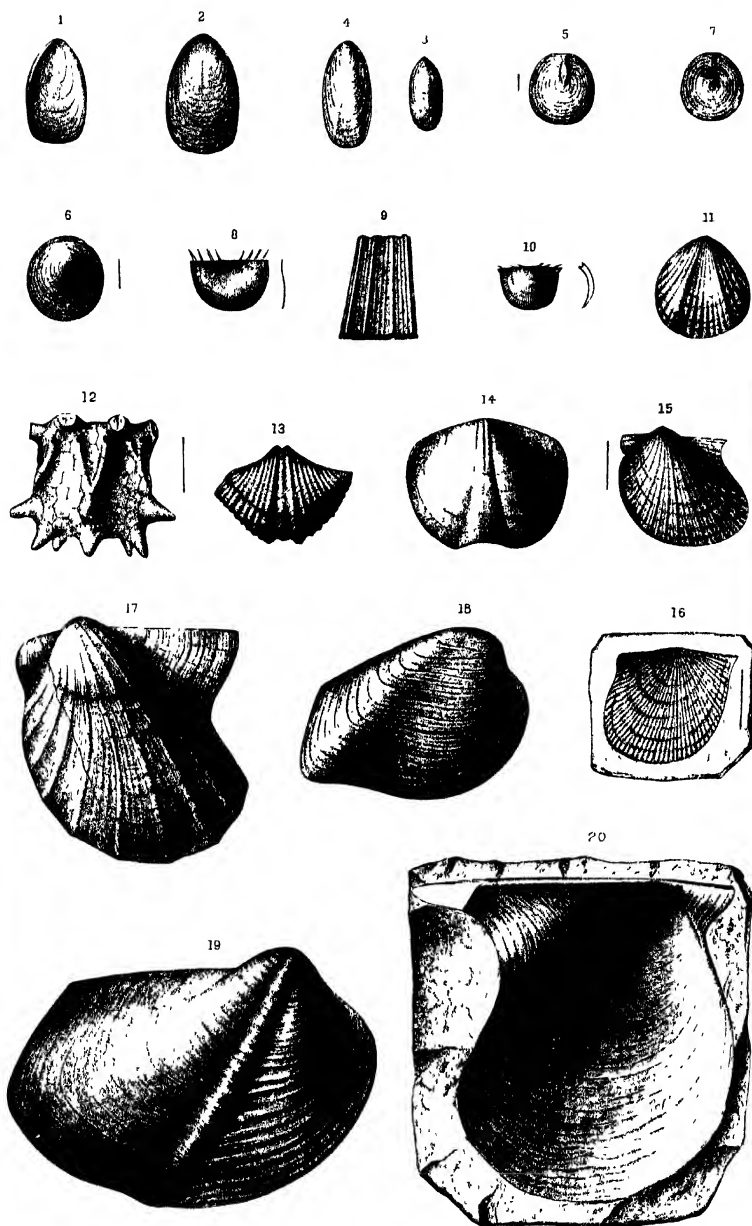
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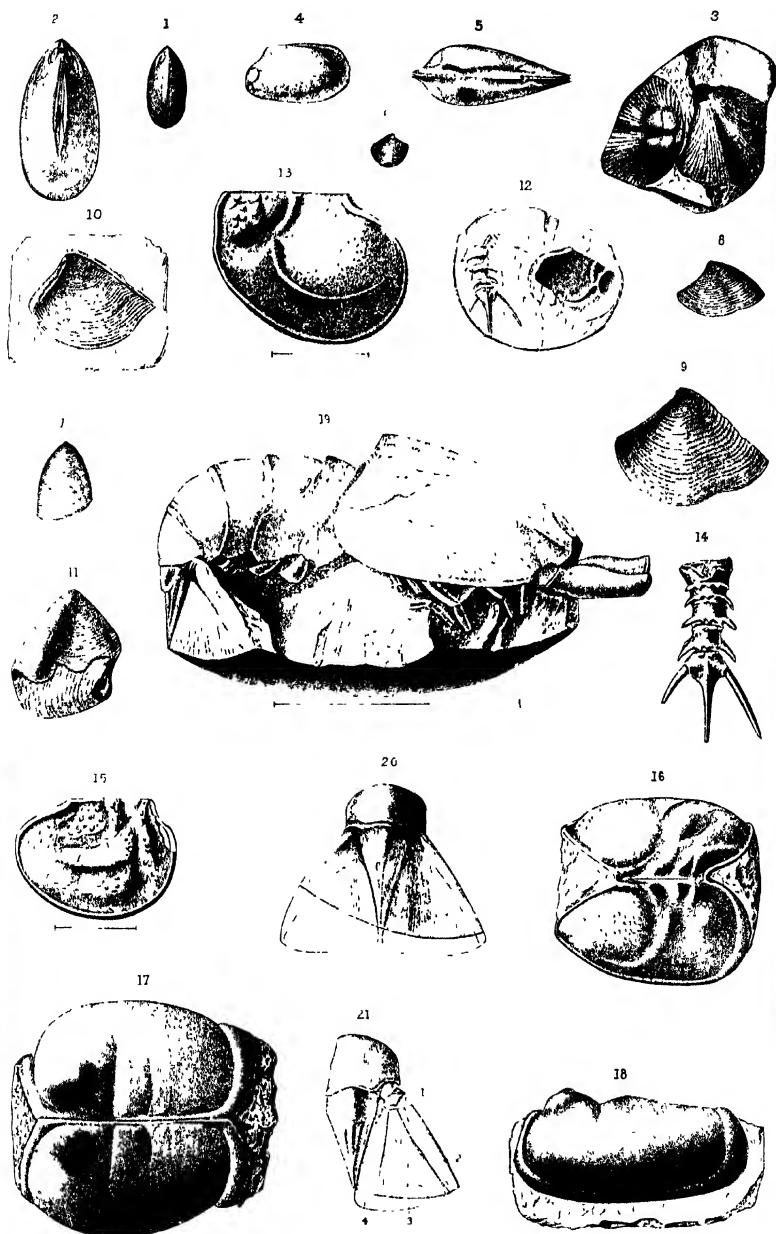


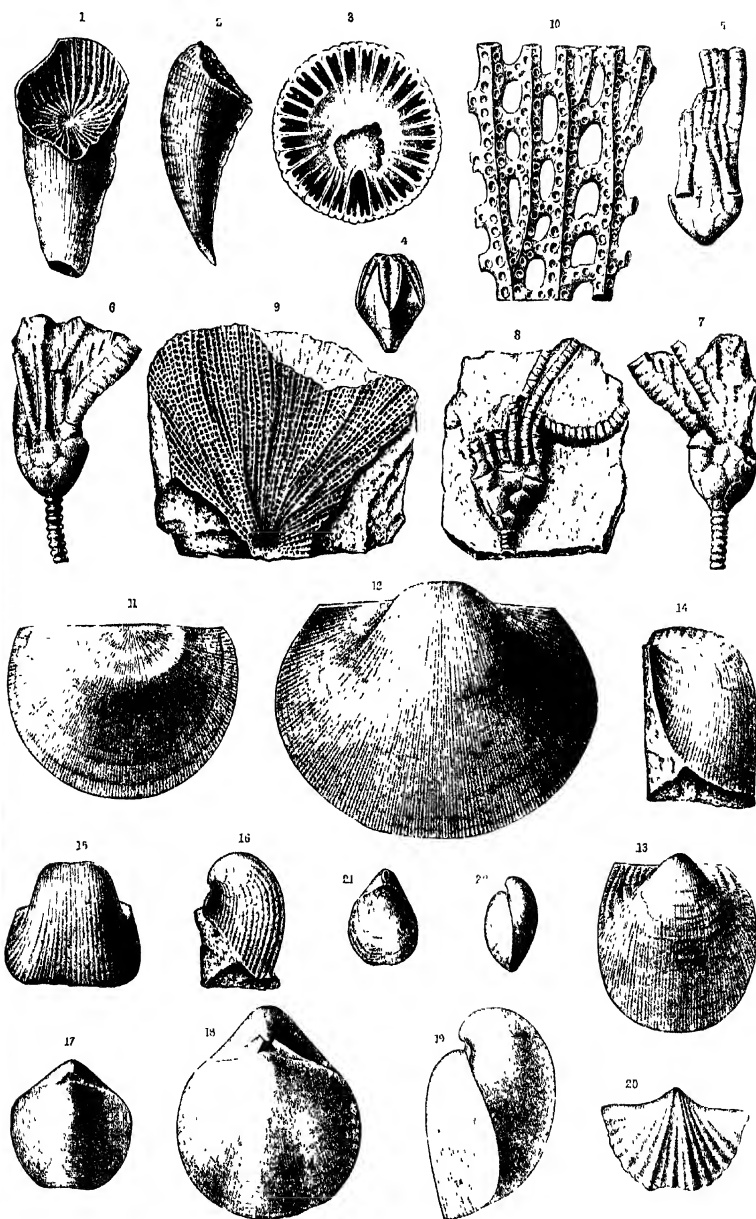
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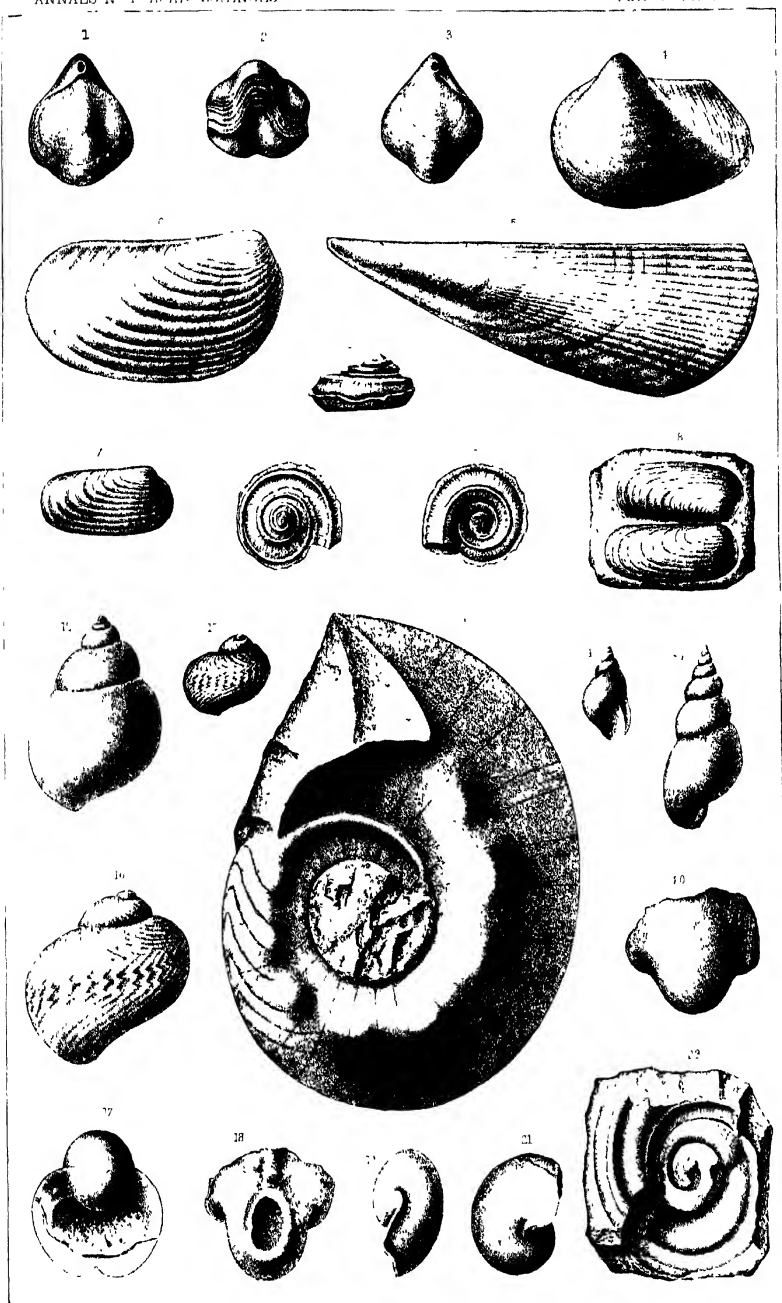


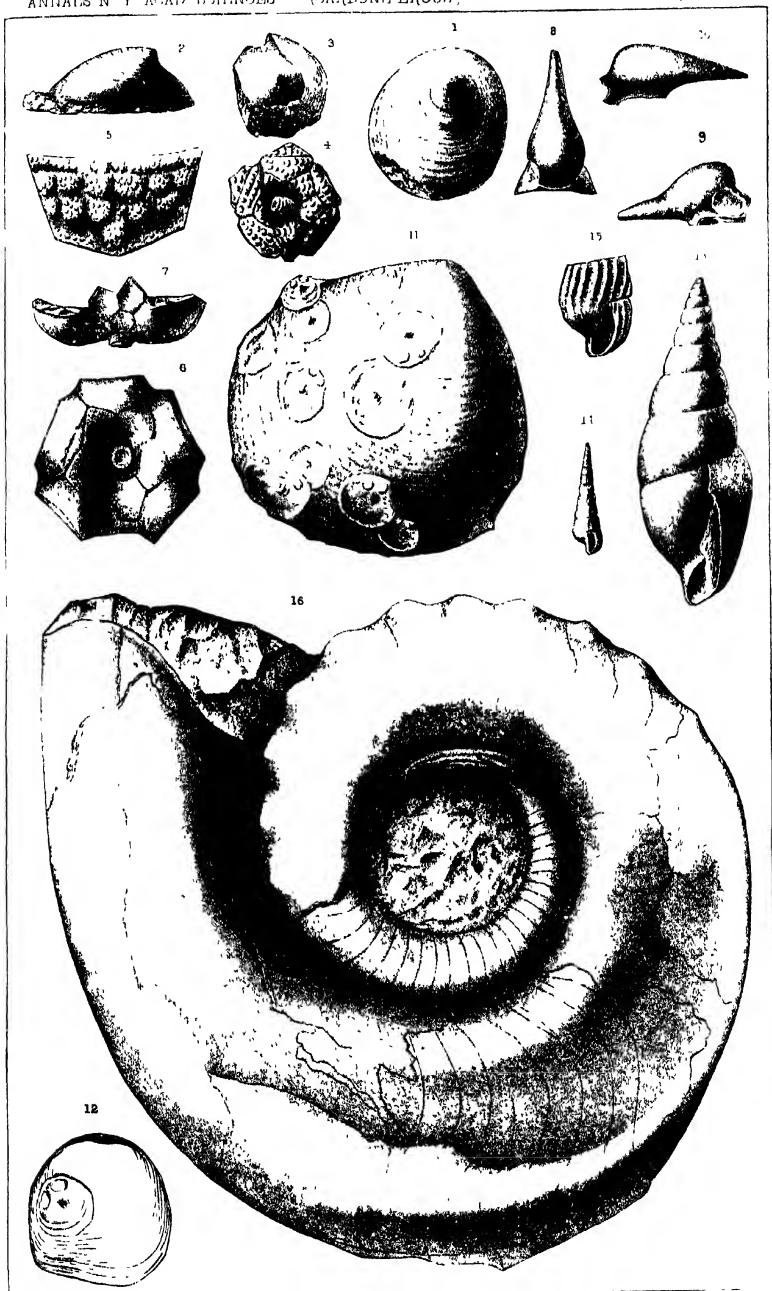


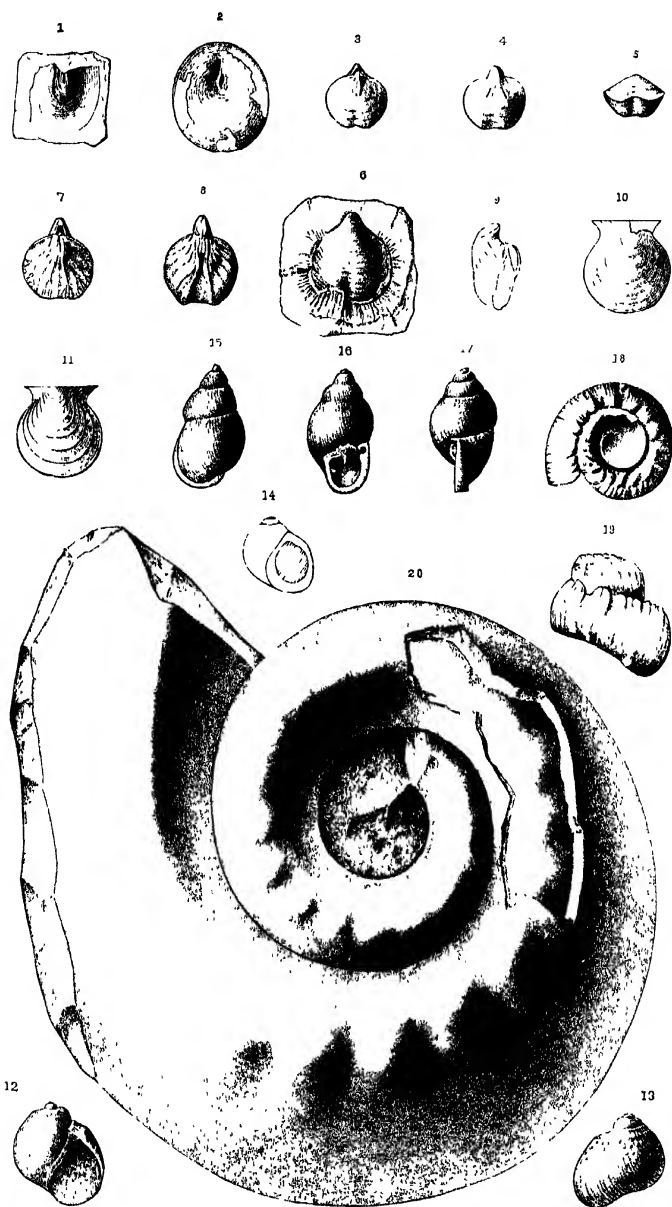












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The names of new genera and species are printed in slightly heavier type, published names in current use in Roman, synonyms and species assigned to erroneous genera in *Italics*. Names of groups, families, and higher divisions are in SMALL CAPITALS.

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